HNTB

HOWARD NEEDLES TAMMEN & BERGENDOFF

January 24, 1975

Mr. Raymond L. Kassel
Deputy Chief Engineer of Planning
Iowa State Highway Commission
Ames, Iowa 50010

Dear Mr. Kassel:

We respectfully submit herewith our Supplemental Report on the studies and investigations of the construction of two new Mississippi River Toll Bridges at Dubuque, Iowa and the imposition of tolls in the present Julien Dubuque Bridge. The new bridges are known as the City Island Bridge and the Route 520 Bridge.

Summary and Recommendations

The following conclusions and recommendations are based upon Howard, Needles, Tammen and Bergendoff's estimated project costs and the traffic and revenue estimates prepared by Wilbur Smith & Associates, Inc., as presented in this report and previous reports and studies.

1. Constructing the City Island Bridge as a four-lane toll facility with the existing Eagle Point Bridge as a private toll facility, and with the Julien Dubuque Bridge remaining "free", and with no additional river crossings in the area is not a feasible alternate.

2. Constructing the City Island Bridge as a four-lane toll facility; constructing the Route 520 bridge as a two-lane toll facility; and imposing tolls on the existing Julien Dubuque Bridge appears to warrant more detailed structure cost and traffic-revenue studies.

Authority and Purpose of Supplemental Report

On September 18, 1974, the Iowa State Highway Commission authorized Howard, Needles, Tammen and Bergendoff, with Wilbur Smith & Associates, Inc., as a sub-contractor, to perform engineering services related to updating the October, 1968 study of Mississippi River Toll Bridges of Dubuque, Iowa. The present study is to determine the need, if any, for more detailed investigations of the feasibility of toll bridges at Dubuque. A copy of the original 1968 report is attached as the Appendix.

Planning Engineering Architectural Services **1805 Grand Avenue, Kansas City, Missouri 64108, 816 474-4900**

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Scope of Present Studies

The scope of the present work is limited to a quick and basic update of estimated project costs, and estimated traffic and net revenues for:

1. The proposed Mississippi River crossing at the City Island location as a toll facility; and

2. The City Island Toll Bridge in conjunction with the proposed Route 520 Toll Bridge and imposition of tolls on the present Julien Dubuque Bridge.

Bridge Studies

1. General

The locations of the bridges considered in this study are shown in Exhibits S-1, S-2 and S-3. The relative locations are shown in Exhibit I-2 of the original October, 1968 report appended hereto, with City Island Alternate and Highway 20 Bypass Alternate of that Exhibit corresponding respectively to the presently proposed City Island Bridge and Route 520 Bridge.

The proposed locations have been reviewed by the United States Coast Guard regarding the effect of the bridges on river navigation. The Coast Guard's report, included herein as Exhibit S-4, now requests provisions for navigation channels of 600 feet and 500 feet at the City Island and Route 520 Bridges, respectively. Each of these is 100 feet greater than shown in the October, 1968 report.

Howard, Needles, Tammen and Bergendoff personnel reviewed in the field the proposed locations for the City Island and Route 520 Bridges as well as surveying the condition of the existing Julien Dubuque Bridge.

Cost estimates have been made for each of the projects in accordance with roadway widths and project limits provided by the Commission. Structure types and span lengths utilized in the estimates are in accordance with river navigation requirements or as generally considered to be economical span-structure type combinations. Adequate economic span and structure type studies cannot be made without subsurface investigations and therefore are beyond the scope of this study. Nevertheless, the span lengths and structure types are based on the experience of the firm in the design and construction of more than 30 bridges across the Missouri and Mississippi Rivers.

Lacking subsurface information at the proposed bridge sites, the cost estimates have been prepared assuming the structures to be founded on steel friction piles estimated to be 100 to 125 feet long. The estimated length is based upon subsurface information shown in the Julien Dubuque Bridge Construction Plans. It should be noted that this is not necessarily indicative of the subsurface conditions at the City Island or Route 520 Bridge Sites.

Cost estimates are based on unit prices available in late 1974 for comparable construction and then increased by 20% to provide for expected inflation to late 1975. Quantities have been estimated "high" in an attempt to be conservative. We believe that these quantities combined with the provision for 20% escalation in construction prices provides the potential for a "quantity/price" cushion of 5-10%.

2. City Island Bridge

The General Plan and Elevation and a Typical Section of this bridge are shown in Exhibit S-1. The proposed project, delimited by Kerper Boulevard in Iowa and the east bridge abutment in Wisconsin, would be a part of a four-lane facility connecting mid-town Dubuque with U.S. Routes 61 and 151 in Wisconsin, north of East Dubuque, Illinois.

The structure would provide a 28-foot roadway each direction separated by a 3-foot median. A 650-foot tied arch span has been assumed at the navigation channel. It should be noted that other bridge types such as cable stayed steel box girder bridges and segmental prestressed concrete box girder bridges are often found to be economical for spans in this range. Approach spans within the river are shown as continuous plate girders while prestress concrete beam spans have been utilized for the approaches between Kerper Boulevard and the river.

The toll plaza is shown in Exhibit S-1 as being on-structure at City Island. The 0.5% grade in this area suitable for the starting and stopping of traffic at the toll gates. Comparable grades would not be available off-structure except near the proposed connection with U.S. Route 61 and 151 in Wisconsin.

Estimated bridge construction costs and summary of estimated project costs are shown in Tables S-1 and S-2. Additional estimated costs to the State of Wisconsin for the connecting roadway from the bridge to U.S. Routes 61 and 151 are shown in Table S-7. Costs to the State of Iowa for construction west of Kerper Boulevard in Dubuque have not been estimated herein. Costs of connecting roadways are not included in the estimated Project Costs.

3. Route 520 Bridge

This structure would cross the Mississippi approximately 7 miles downstream from the City Island Bridge. The General Plan and Elevation and a Typical Section of this bridge are shown in Exhibit S-2. The bridge would provide a connecting link between the proposed Iowa freeway, Route 520, and U.S. Route 20 in Illinois.

The structure would provide a two-lane, two-directional roadway, 40-foot curb to curb. This roadway would adequately carry the estimated near-term traffic. When warranted by future traffic volumes, this bridge could be made one directional, and with the construction of a parallel structure, would provide a high-grade, multi-lane river crossing.

A 550-foot tied arch span has been assumed at the navigation channel. An alternative structure type which could be considered for this span length is the segmental prestressed concrete box girder. Approach spans are shown as continuous plate girders.

The toll plaza, shown on the Iowa approach roadway, has been included in the estimated project cost. Estimated costs of the roadway connecting the bridge project with U.S. 52 in Iowa and with U.S. Route 20 in Illinois are shown in Table S-7. Estimated connecting roadway costs have not been included in the estimated project costs.

4. Julien Dubuque Bridge Modification

A study of the construction plans indicated two potential sites for a toll plaza - one at the west approach at the site of the original toll plaza, the other on the east approach spans near the intersection of Second and Menomonee Streets in East Dubuque, Illinois. The first site was rejected after a field inspection because of inadequate area for the number of toll lanes required, insufficient storage capacity for traffic and unsuitable resulting traffic conditions at the intersection of Dodge and Locust Streets in Dubuque.

The toll plaza is shown on-structure in Exhibit S-3, located on the gentle grades of the east approaches in Illinois. The widening for the plaza is eccentric to the existing roadway to avoid interference with new industrial developments along the north side of the bridge.

Cost estimates have been made for widening the bridge to accommodate the plaza and are shown in Table S-5. Total estimated costs for the modification project are given in Table S-6. There should be no work required outside the project limits.

Operation and Maintenance Costs

The estimate of first year expenses for Operation and Maintenance for the City Island Bridge, the Route 520 Bridge and the Julien Dubuque Bridge Modification are shown in Tables S-8, S-9 and S-10, respectively. It has been assumed that the toll bridges will be operated by a public agency and as such will not be subject to property and other local taxes. The first year maintenance cost recognizes the age of and the need for greater yearly maintenance expenses at the Julien Dubuque Bridge.

The Annual Operation and Maintenance Costs are shown in Table S-11.

We wish to acknowledge the unreserved cooperation received in this study from Wilbur Smith & Associates and the valued information provided by the Iowa State Highway Commission.

Very truly yours,

HOWARD NEEDLES TAMMEN & BERGENDOFF

Paul L. Heineman

Paul L. Heineman

PLH/cd

Enclosures:
Tables S-1 to S-11
Exhibits S-1 to S-4
APPENDIX: Bridge Location, Revenue and Traffic Studies at Dubuque, Iowa, October 1968.

TABLE S-1

ESTIMATE OF CONSTRUCTION COST

CITY ISLAND BRIDGE

Dubuque, Iowa

Continuous Prestressed Concrete Girder Spans	3,800 ft.	
Continuous Steel Girder Spans	1,270 ft.	Roadway Width = 59'- 0" Curb-to-Curb
Tied Arch Span	650 ft.	
Continuous Steel Girder Spans	1,270 ft.	
	6,990 ft.	

ITEM	QUANTITY	UNIT PRICE	COST
Superstructure:			
Bridge Railing	13,980 L.F.	25.00	$ 349,500
Concrete	12,240 C.Y.	200.00	2,448,000
Reinforcing Steel	3,659,000 Lbs.	0.40	1,463,600
Prestressed Concrete Girders	34,700 L.F.	60.00	2,082,000
Girder Steel	6,158,000 Lbs.	0.75	4,618,500
Miscellaneous Metals	4,609,000 Lbs.	0.85	3,917,600
Navigation Lighting	170,000 Lbs.	1.50	255,000
	Lump Sum		40,000
	SUBTOTAL		$15,174,200
Substructure:			
Concrete	14,080 C.Y.	150.00	$ 2,112,000
Reinforcing Steel	1,540,000 Lbs.	0.40	616,000
Steel Friction Piles(HP14x73)	148,000 L.F.	18.00	2,664,000
Cofferdams	41,000 S.F.	8.00	328,000
Excavation	8,400 C.Y.	30.00	252,000
	SUBTOTAL		$ 5,972,000
	TOTAL BRIDGE COST		$21,146,200 - 1974 Prices

Times 1.20 for Cost Escalation - $ 25,375,400 - 1975 Prices

Table S-2

SUMMARY OF ESTIMATED PROJECT COSTS

Dubuque, Iowa Bridges

City Island Bridge

From Kerper Blvd. to Wisconsin (East) Abutment

	Iowa	Wisconsin
Roadway	$ -	$ -
Structures	25,375,400	-
Subtotal	$ 25,375,400	$ -
Toll Booth Complex	$ 200,000	$ -
Engineering and Contingencies	5,115,000	-
Total Construction	$ 30,690,400	$ -
Right of Way	$ 107,000	$ -
Acquisitions and Contingencies	21,400	-
Legal	10,700	
TOTAL	$ 30,829,500	$ -

TOTAL PROJECT COST - $ 30,829,500

NOTE: Costs are based on 1975 prices estimated at 120% of 1974 prices.

TABLE S-3

ESTIMATE OF BRIDGE CONSTRUCTION COST

ROUTE 520 BRIDGE

Dubuque, Iowa

Continuous Girder	750 ft.	Roadway Width = 40'-0" Curb-to-Curb
Tied Arch Span	550	
Continuous Girder Spans	1,420	
	2,720 ft.	

ITEM	QUANTITY	UNIT PRICE	COST
Superstructure:			
Bridge Railing	5,440 L.F.	$25.00	$ 136,000
Concrete	3,240 C.Y.	200.00	648,000
Reinforcing Steel	970,000 Lbs.	0.40	388,000
Girder Steel	3,967,000 Lbs.	0.75	2,975,200
Tied Arch Steel	2,464,000 Lbs.	0.85	2,094,400
Miscellaneous Metals	110,000 Lbs.	1.50	165,000
Navigation Lighting		Lump Sum	40,000
	SUBTOTAL		$6,446,600
Substructure:			
Concrete	9,190 C.Y.	150.00	$ 1,378,500
Reinforcing Steel	724,000 Lbs.	0.40	289,600
Steel Friction Piles (HP14x73)	61,900 L.F.	16.00	990,400
Cofferdams	49,300 S.F	8.00	394,400
Excavation	7,970 C.Y.	30.00	239,100
		SUBTOTAL	$ 3,292,000
		TOTAL BRIDGE COST	$ 9,738,600 - 1974 Prices
		Times 1.20 for Cost Escalation to 1975	-$11,686,300 - 1975 Prices

Table S-4

SUMMARY OF ESTIMATED PROJECT COSTS

Dubuque, Iowa Bridges

Route 520 Bridge

From Toll Plaza to Illinois (East) Abutment

	Iowa	Illinois
Roadway	$ 175,000	$ -
Structures	11,686,300	-
Subtotal	$ 11,861,300	$ -
Toll Booth Complex	$ 150,000	$ -
Engineering and Contingencies	2,402,200	-
Total Construction	$ 14,413,500	$ -
Right of Way	$ 8,700	$ 5,000
Acquisitions and Contingencies	2,000	2,000
Legal	1,000	1,000
TOTAL	$ 14,425,200	$ 8,000

TOTAL PROJECT COST - $ 14,433,200

NOTE: Costs are based on 1975 prices estimated at 120% of 1974 prices.

Table S-5

ESTIMATE OF CONSTRUCTION COST

JULIEN DUBUQUE BRIDGE MODIFICATION

Dubuque, Iowa

ITEM	QUANTITY	UNIT PRICE	COST
Superstructure:			
Relocate Bridge Railing	1,205 L.F.	12.00	$ 14,460
Concrete	623 C.Y.	225.00	140,175
Reinforcing Steel	187,000 Lbs.	0.42	78,540
Structural Steel	550,000 Lbs.	0.77	423,500
Miscellaneous Metal	11,000 Lbs.	1.50	16,500
Removal of Curbs and Sidewalk	1,200 L.F.	15.00	18,000
	SUBTOTAL		$ 691,175
Substructure:			
Concrete	800 C.Y.	200.00	$ 160,000
Reinforcing Steel	10,000 Lbs.	0.40	40,000
Steel Piles (HP 14x73)	3,600 L.F.	20.00	72,000
Excavation	160 C.Y.	35.00	5,600
	SUBTOTAL		$ 277,600
	TOTAL BRIDGE COST		$ 968,775 - 1974 Prices

Times 1.20 for Cost Escalation - $1,162,530 - 1975 Prices

Table S-6

SUMMARY OF ESTIMATED PROJECT COSTS

Dubuque, Iowa Bridges

Julien Dubuque Modification

	Iowa	Illinois
Roadway	$ -	$ -
Structures	1,162,500	-
Subtotal	$ 1,162,500	$ -
Toll Booth Complex	$ 200,000	$ -
Engineering and Contingencies	272,500	-
Total Construction Cost	$ 1,635,000	$ -
Right of Way	$ 40,000	$ -
Acquisitions and Contingencies	8,000	-
Legal	3,000	-
TOTAL	$ 1,686,000	$ -

TOTAL PROJECT COST - $ 1,686,000

NOTE: Costs are based on 1975 prices estimated at 120% of 1974 prices.

Table S-7

SUMMARY OF BRIDGE CONNECTION COSTS

Dubuque, Iowa Bridges

	Route 520 Bridge		City Island Bridge	
	Iowa	Illinois	Iowa	Wisconsin
Roadway	$ 2,500,000	$ 1,460,000	$ -	$ 3,200,000
Structures	-	368,000	-	-
Subtotal	$ 2,500,000	$ 1,828,000	$ -	$ 3,200,000
Engineering and Contingencies	$ 500,000	$ 365,600	$ -	$ 640,000
Total Construction	$ 3,000,000	$ 2,193,600	$ -	$ 3,840,000
Right of Way	$ 33,500	$ 15,000	$ -	$ 48,000
Acquisitions and Contingencies	6,700	4,000	-	9,600
Legal	2,000	2,000	-	5,700
TOTAL	$ 3,042,200	$ 2,214,600	$ -	$ 3,903,300
TOTAL PROJECT	$ 5,256,800		$ 3,903,300	

TABLE S-8

ESTIMATE OF FIRST YEAR EXPENSES

FOR

OPERATION AND MAINTENANCE

CITY ISLAND BRIDGE

Dubuque, Iowa

ADMINISTRATION		
Toll Superintendent	$ 13,000	
Travel and Car Expense	1,500	
Consulting Engineers	5,000	
Miscellaneous	1,500	
Total Administration		$ 21,000
OPERATION		
Toll Collectors	$ 93,600	
Special Maintenance	10,000	
Utilities	5,000	
Supplies and Postage	3,400	
Employee Benefits	10,000	
Total Operation		$ 122,000
MAINTENANCE*		$ 10,000
INSURANCE		$ 20,000
MAINTENANCE RESERVE		$ 15,000
TOTAL OPERATION AND MAINTENANCE		$ 188,000

*By District Maintenance Forces on Force Account Cost Basis

TABLE S-9

ESTIMATE OF FIRST YEAR EXPENSES

FOR

OPERATION AND MAINTENANCE

ROUTE 520 BRIDGE

Dubuque, Iowa

ADMINISTRATION		
Toll Superintendent	$ 10,000	
Travel & Car Expense	1,500	
Consulting Engineers	3,500	
Miscellaneous	1,000	
Total Administration		$ 16,000
OPERATION		
Toll Collectors	$ 39,000	
Special Maintenance	8,000	
Utilities	4,500	
Supplies & Postage	2,500	
Employee Benefits	4,500	
Total Operation		$ 58,500
MAINTENANCE*		$ 10,000
INSURANCE		$ 15,500
MAINTENANCE RESERVE		$ 12,000
TOTAL OPERATION & MAINTENANCE		$ 112,000

*By District Maintenance Forces on
Force Account Cost Basis

TABLE S-10

ESTIMATE OF FIRST YEAR EXPENSES

FOR

OPERATION AND MAINTENANCE

JULIEN DUBUQUE BRIDGE

Dubuque, Iowa

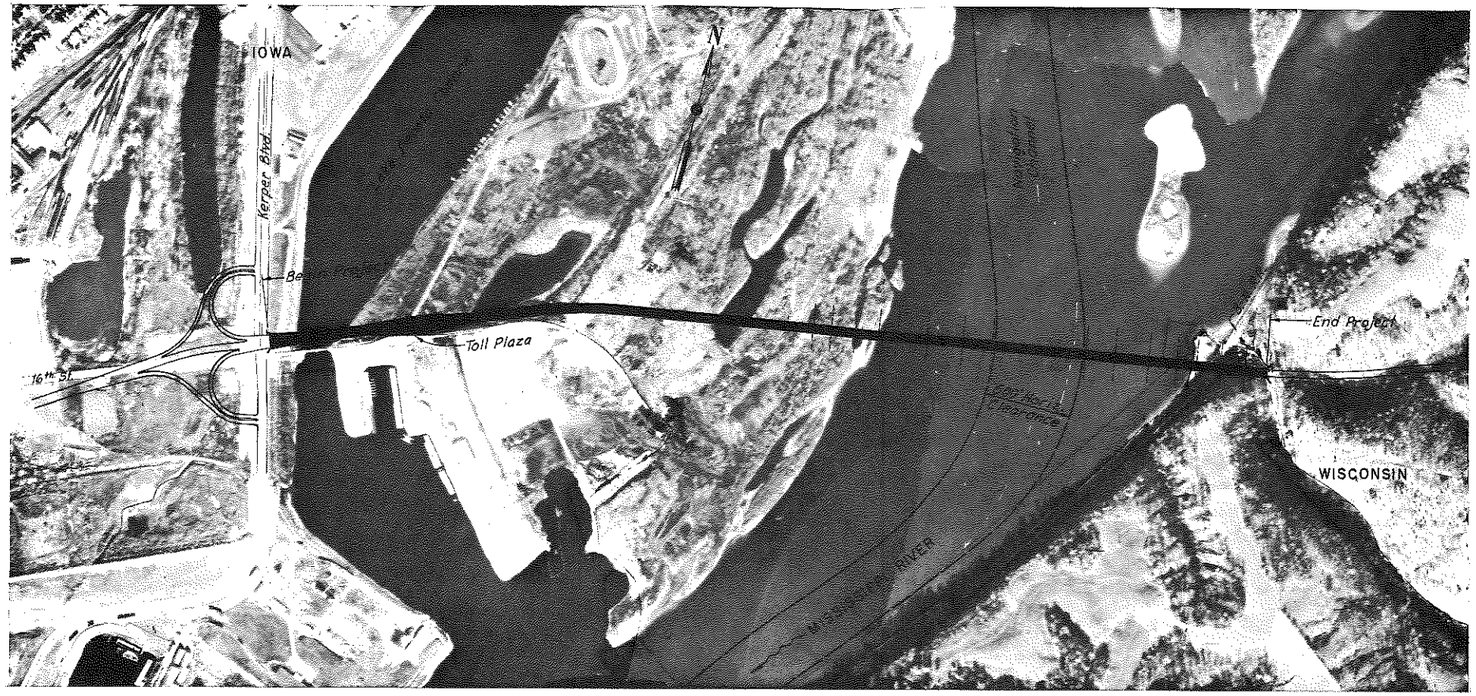
ADMINISTRATION		
Toll Superintendent	$ 13,000	
Travel and Car Expense	1,500	
Consulting Engineers	5,000	
Miscellaneous	1,500	
Total Administration		$ 21,000
OPERATION		
Toll Collectors	$ 93,600	
Special Maintenance	10,000	
Utilities	5,000	
Supplies and Postage	3,400	
Employee Benefits	10,000	
Total Operation		$ 122,000
MAINTENANCE*		$ 15,000
INSURANCE		$ 20,000
MAINTENANCE RESERVE		$ 30,000
TOTAL OPERATION AND MAINTENANCE		$ 208,000

*By District Maintenance Forces
On Force Account Cost Basis

TABLE S-11

ANNUAL OPERATION & MAINTENANCE COSTS

Calendar Year	City Island Bridge	Route 520 Bridge	Julien Dubuque Bridge
1978	$ 188,000	$ 112,000	$ 208,000
1979	196,000	117,000	216,000
1980	204,000	122,000	224,000
1981	212,000	127,000	232,000
1982	220,000	132,000	240,000
1983	228,000	137,000	248,000
1984	236,000	142,000	256,000
1985	244,000	147,000	264,000
1986	252,000	152,000	272,000
1987	260,000	157,000	280,000
1988	268,000	162,000	288,000
1989	276,000	167,000	296,000
1990	284,000	172,000	304,000
1991	292,000	177,000	312,000
1992	300,000	182,000	320,000
Next 13 Years Annually	300,000	182,000	320,000



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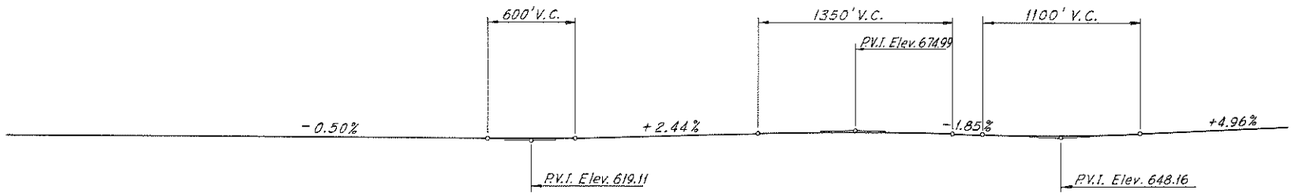
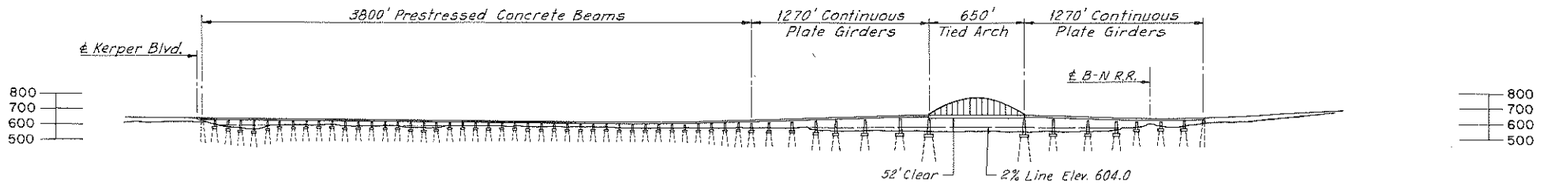
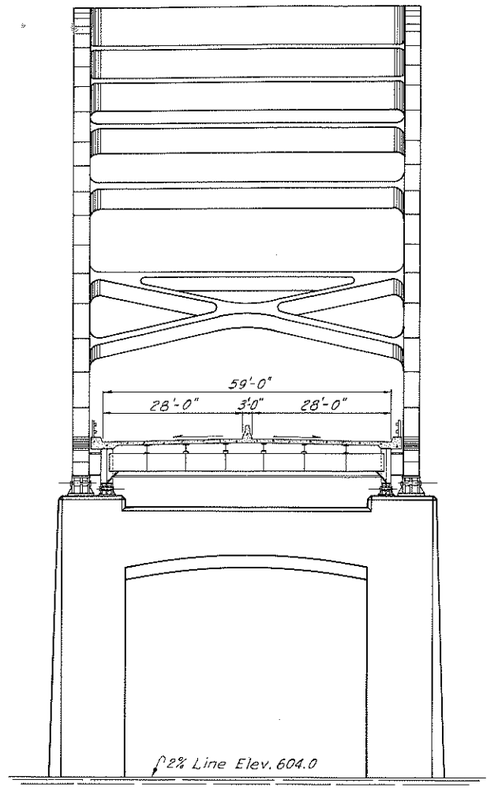


PROFILE GRADE



ELEVATION

500 0 500
SCALE IN FEET



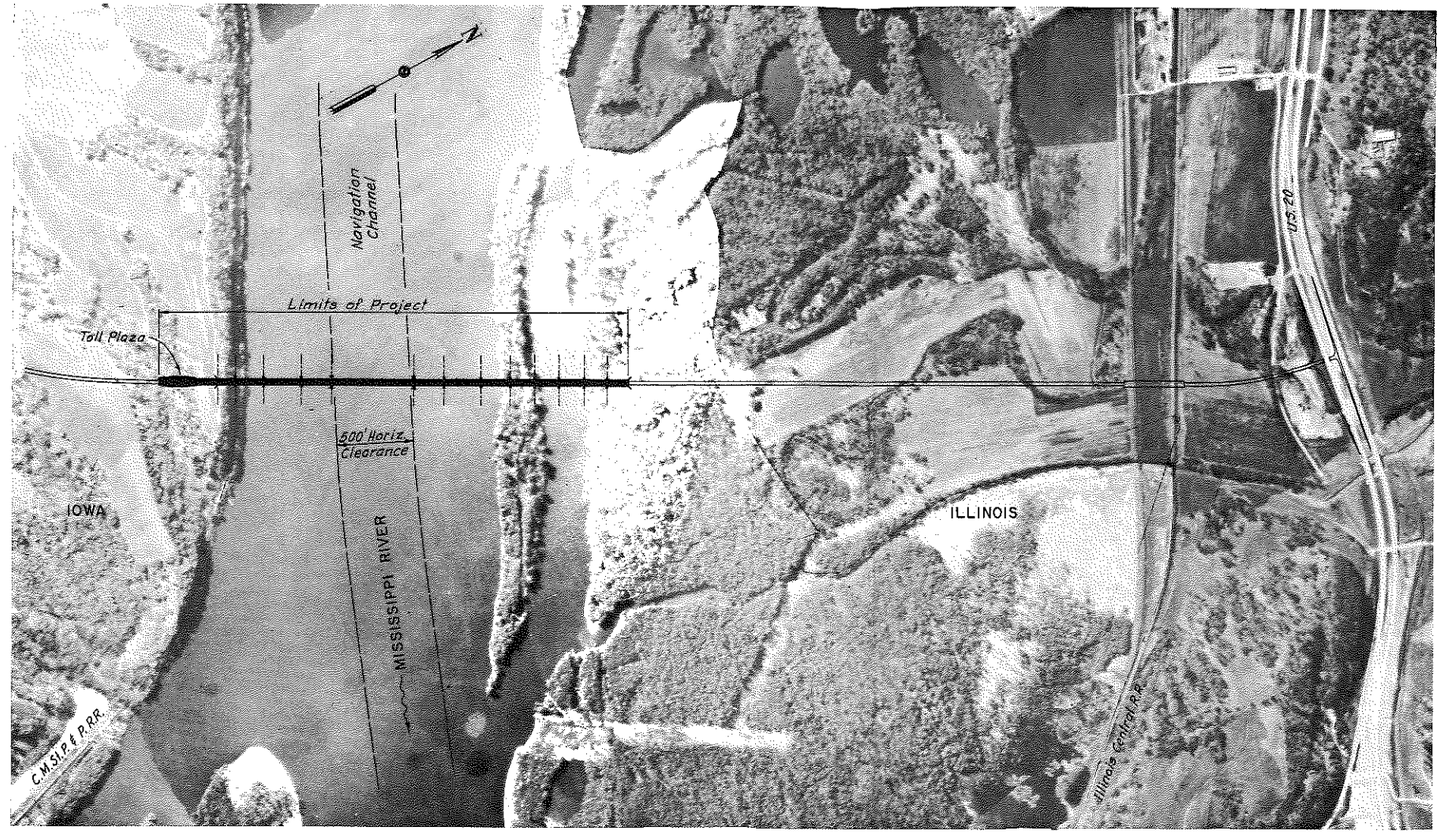
SECTION THRU PLATE GIRDER SPAN
NEAR CHANNEL PIER

10 0 10 20
SCALE IN FEET

Exhibit S-1

CITY ISLAND BRIDGE

GENERAL PLAN AND ELEVATION



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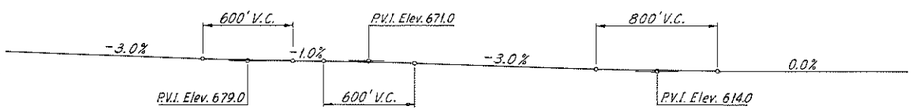

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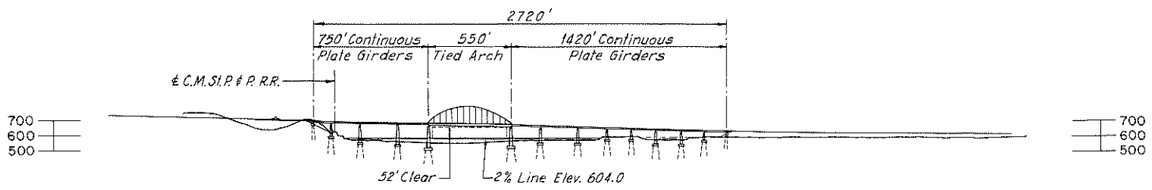
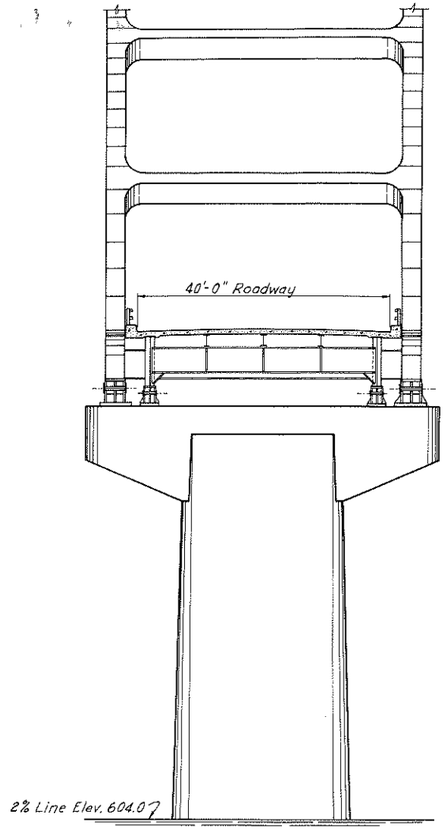


ELEVATION

500 0 500

SCALE IN FEET



SECTION THRU PLATE GIRDER SPAN NEAR CHANNEL PIER

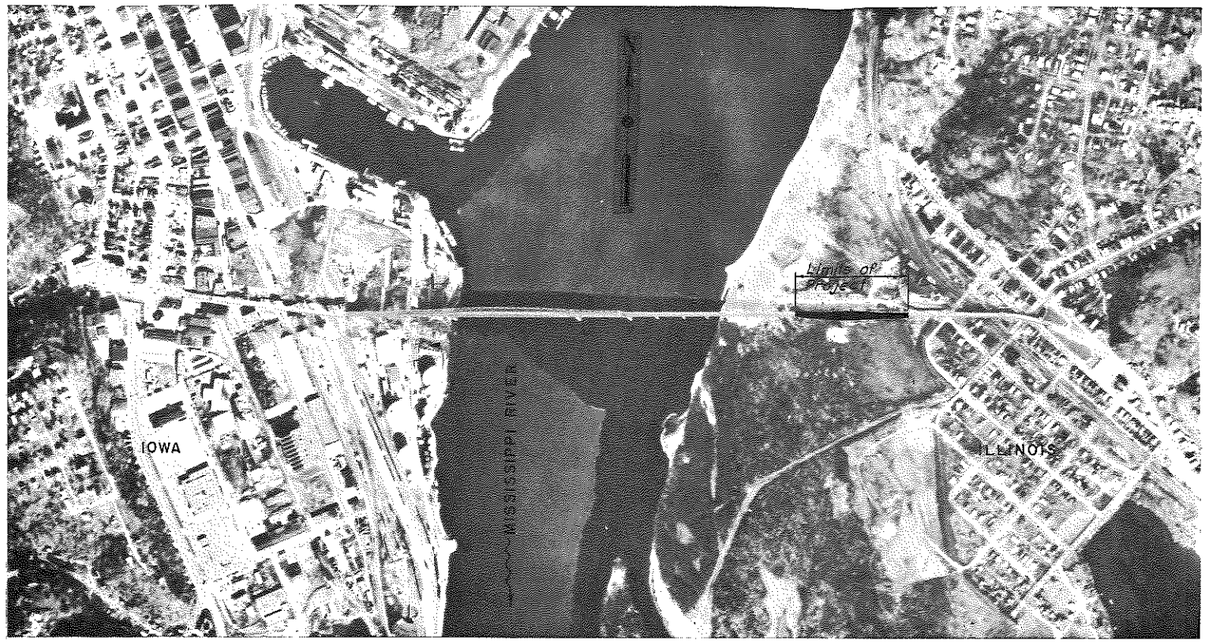
10 0 10 20

SCALE IN FEET

Exhibit S-2

ROUTE 520 BRIDGE

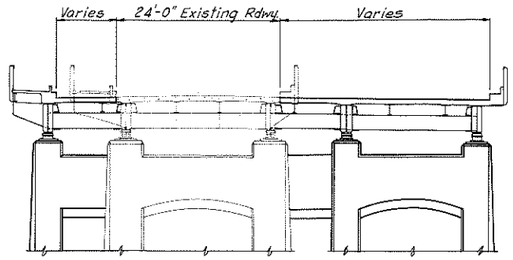
GENERAL PLAN AND ELEVATION



PLAN

500 0 500

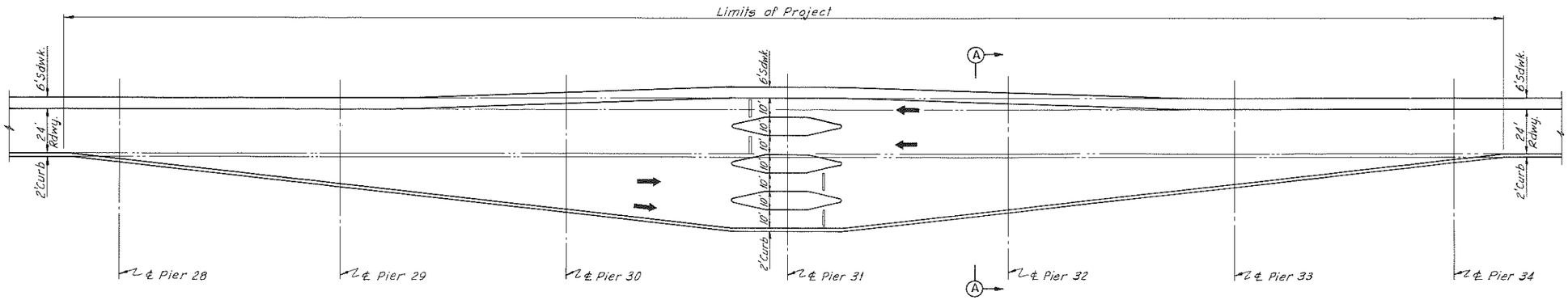
SCALE IN FEET



SECTION A-A

10 0 10 20

SCALE IN FEET



PROPOSED WIDENING FOR TOLL PLAZA

20 0 20 40

SCALE IN FEET

Exhibit S-3

JULIEN DUBUQUE BRIDGE

GENERAL PLAN AND MODIFICATIONS

Exhibit S-4

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
COMMANDER (oan)
SECOND COAST GUARD DISTRICT
FEDERAL BLDG.
1520 MARKET ST.
ST. LOUIS, MO. 63103

Tel, 314-622-4607
3270
4 December 1974

Mr. Robert G. Crabtree
Howard Needles Tammen and Bergendoff
1805 Grand Avenue
Kansas City, Missouri 64108

Re: Bridge Feasibility Studies, Dubuque, Iowa

Dear Mr. Crabtree:

We have studied the locations for the two bridges proposed above and below Dubuque; we have also obtained informal comments from two active Upper Mississippi River pilots and viewed the sites. We conclude as follows:

City Island, approx Mile 58.4

This location is in the approach to a bend where downbound tows under certain conditions of wind and current must be steering sharply away from the Wisconsin shore. A typical fifteen barge tow, 105' x 75' long, could, in doing so, occupy a corridor 350-400 feet wide. Therefore, in order to provide for the safe and unimpeded passage of tows, we believe that a 600-foot span would not be unreasonable at this location. We would point out, however, that we are more interested in pier location than in the dimension. Further investigation will be necessary to establish pier locations. Please note the blue line on the enclosed Navigation Chart No. 107 showing our preference for location. There is a navigational advantage in moving it upstream away from the bend.

520 (Menominee River), approx Mile 574.5

This is a straighter reach than at the City Island location. We believe that first of all the channel pier on the Illinois side should be located on the bank or nearly so. The Iowa channel pier should be located so as to provide for safe and unimpeded navigation through the span. We believe that a span of not less than 500 feet horizontal clearance would meet the reasonable needs of navigation at this location. Please note the blue line on the enclosed Navigation Chart No. 106 showing our preference for locations.

Re: Bridge Feasibility Studies, Dubuque, Iowa

Minimum vertical clearance guides for bridges over this reach of the Upper Mississippi River is 52 feet above the 2% line, or 60 feet above flat pool, whichever is greater. The Corps of Engineers is the Federal Agency which is responsible for disseminating information regarding water surface elevation on navigable waterways. We suggest that you contact the District Engineer, U. S. Army Corps of Engineers, Rock Island District, Clock Tower Building, Rock Island, Illinois 61202 for the currently correct elevations.

We appreciate the opportunity to comment on these crossings at this early stage. Please contact us again if we can contribute additional information.

Sincerely,

S. W. THOROUGHMAN
Chief, Bridge Section
Second Coast Guard District
By direction of the District Commander

Encl: (1) Navigation Chart No. 106
(2) Navigation Chart No. 107

CORPS OF ENGINEERS

U S ARMY

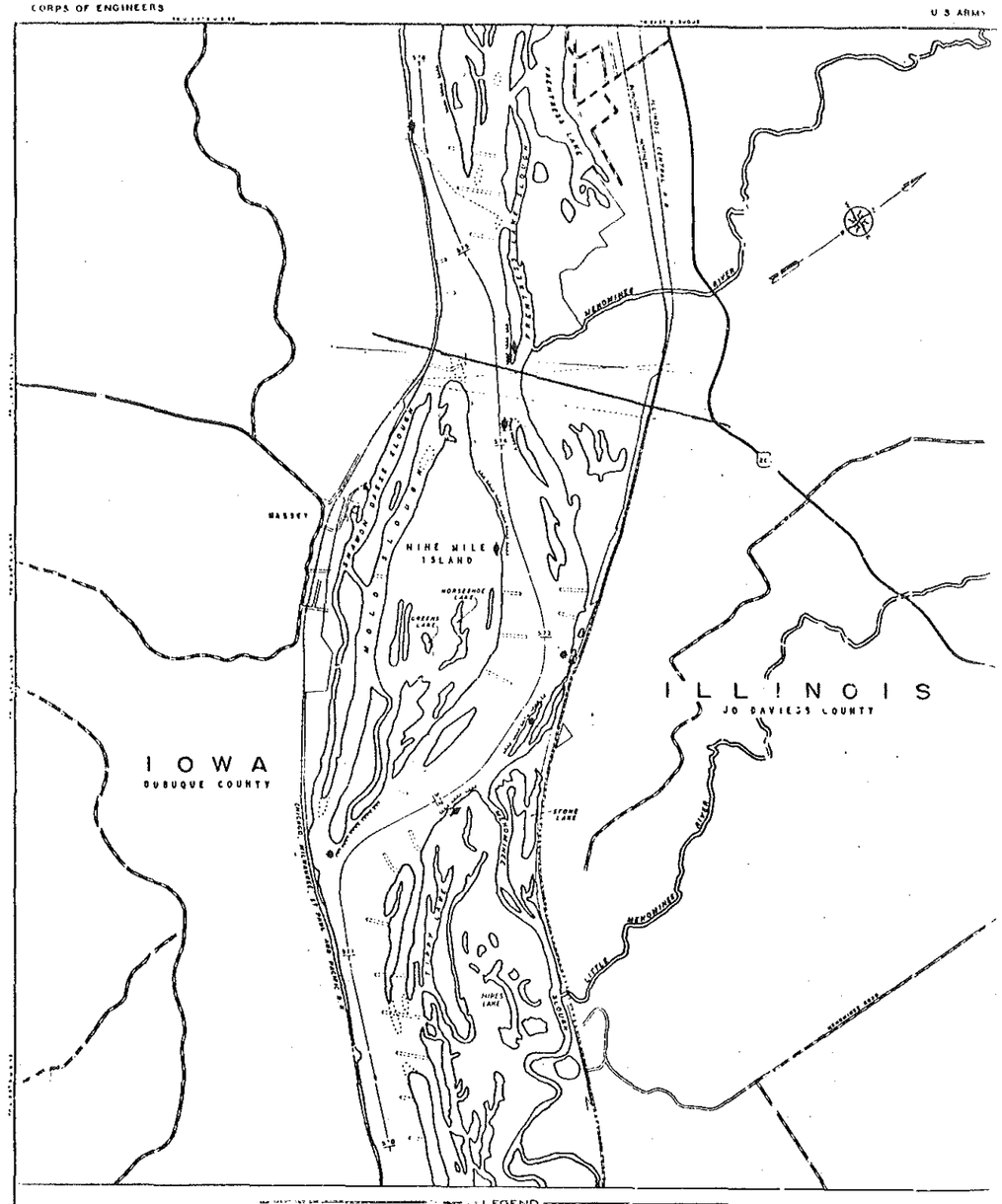
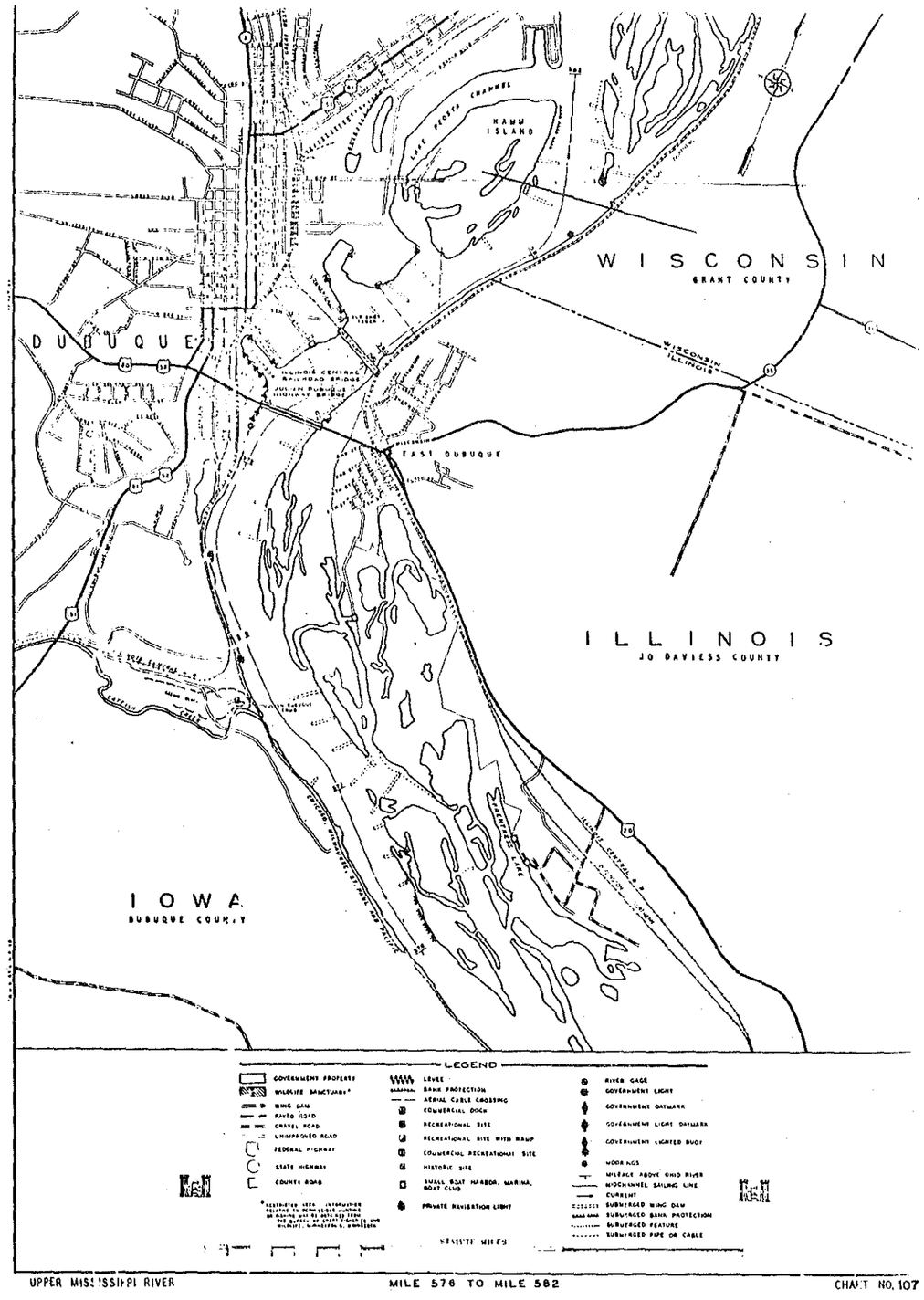


Chart No. 106



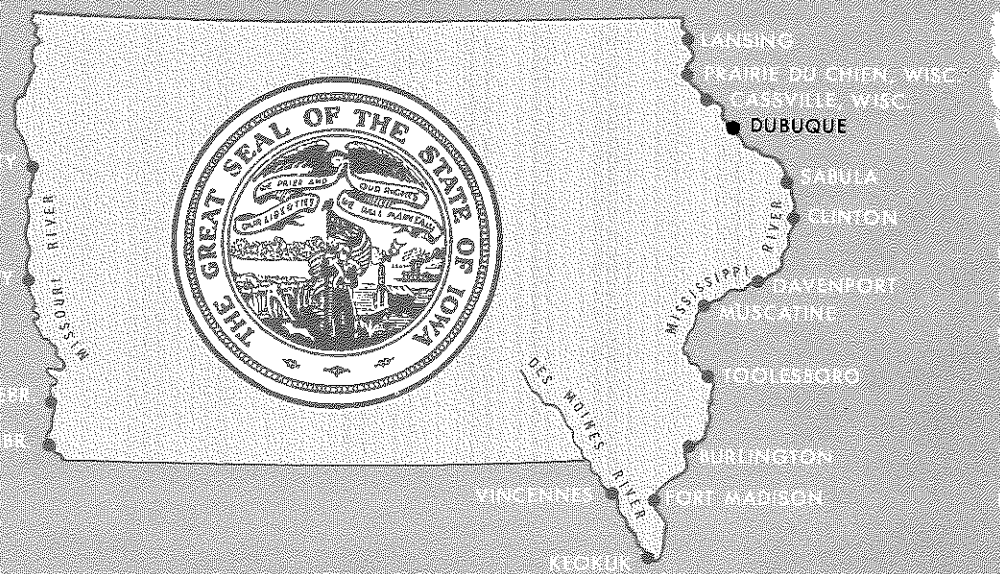
UPPER MISSISSIPPI RIVER — MILE 576 TO MILE 582 — CHART NO. 107

APPENDIX

MISSISSIPPI RIVER TOLL BRIDGE

OCTOBER 1968

IOWA STATE HIGHWAY COMMISSION



Bridge Location, Revenue and Traffic Studies

AT

DUBUQUE, IOWA

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
KANSAS CITY, MO. NEW YORK, N.Y.

WILBUR SMITH & ASSOCIATES
traffic consultants
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TRANSPORTATION CONSULTANTS
155 WHITNEY AVENUE • P. O. BOX 993
New Haven, Conn. 06510

October 31, 1968

Mr. J. R. Coupal, Jr.
Director of Highways
Iowa State Highway Commission
Ames, Iowa 50010

Dear Mr. Coupal:

We are pleased to submit this preliminary feasibility report for new Mississippi River bridges at Dubuque.

The report includes an analysis of alternate bridge locations, preliminary engineering studies, traffic and toll revenue estimates, preliminary project costs and an indication of project feasibility.

Seven alternate bridge construction programs have been studied, the proposals which assume imposition of tolls on the present Julien Dubuque Bridge in conjunction with construction of two or more new crossings indicate considerably higher financial feasibility levels than those which assume the bridge will remain free.

We gratefully acknowledge the assistance and cooperation given to us by members of your staff and the numerous other public and private agencies and individuals contacted in the course of our studies.

Respectfully submitted,

HOWARD, NEEDLES, TAMMEN & BERGENDOFF

Paul L. Heineman

Paul L. Heineman

WILBUR SMITH & ASSOCIATES, INC. N.E.

Wilbur S. Smith

Wilbur S. Smith

I hereby certify that this plan, specification or report was prepared by me or under my direct personal supervision, and that I am a duly registered Professional Engineer under the laws of the State of Iowa.

Signed ..... Date .....
Paul L. Heineman, P.E. Iowa Reg. No. 5156 October 31, 1968

Signed .....
Wilbur S. Smith, P.E. Iowa Reg. No. 4007 October 31, 1968

VIEW OF EAGLE POINT BRIDGE FROM DUBUQUE, IOWA, LOOKING SOUTHEAST

DUBUQUE, IOWA

MISSISSIPPI RIVER TOLL BRIDGE

OCTOBER

1968

PRELIMINARY ENGINEERING REPORT

- LOCATION STUDIES
- PRELIMINARY DESIGN
- COST ESTIMATES
- TRAFFIC AND REVENUE STUDIES

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
consulting engineers
KANSAS CITY, MO. NEW YORK, N.Y.

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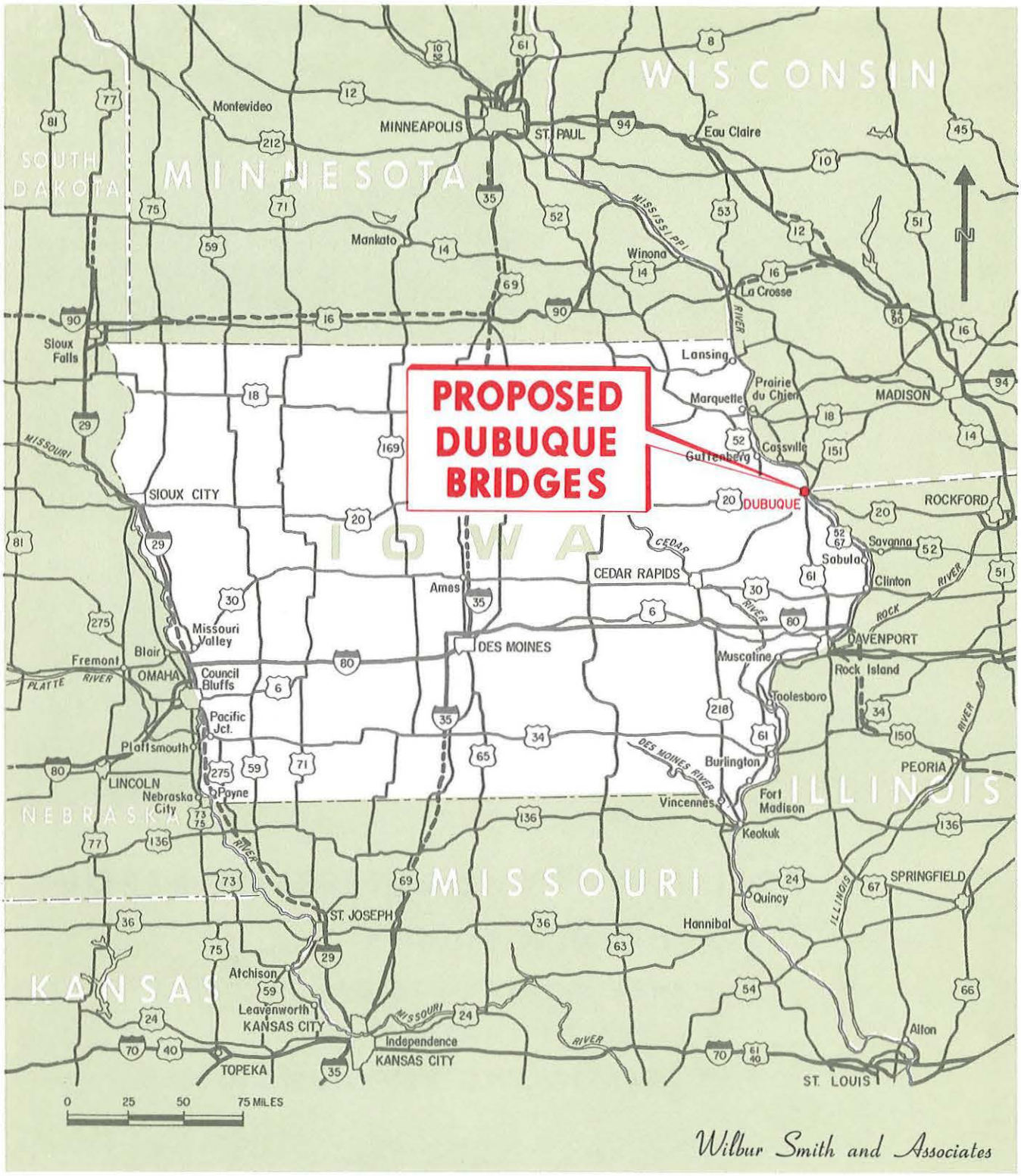

Exhibit 1

REGIONAL MAP

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LIST OF ILLUSTRATIONS

APPENDIX

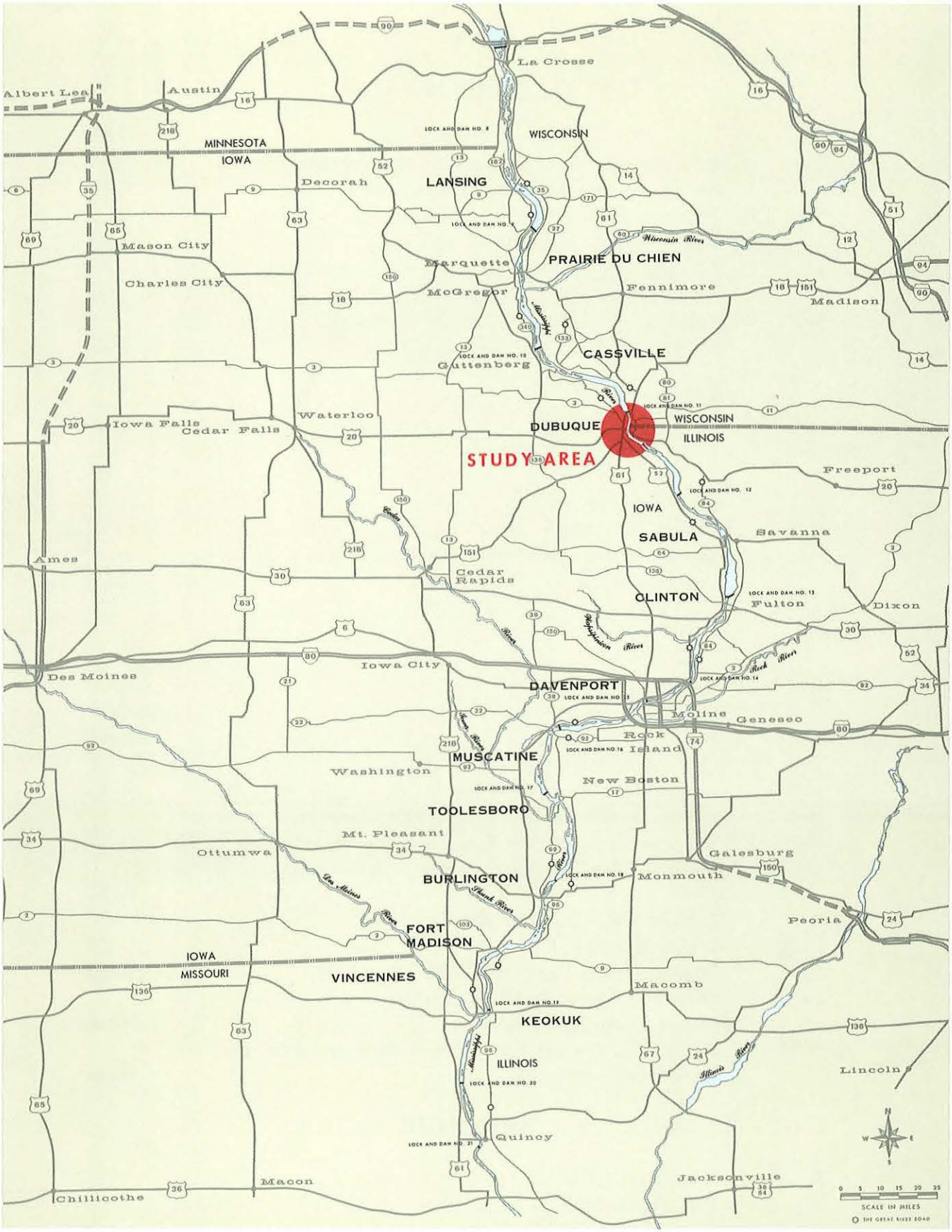


Exhibit 2

VICINITY MAP

SUMMARY OF FINDINGS

The present Eagle Point Bridge at Dubuque, a toll facility, does not provide a desirable level of traffic service in the Dubuque-Wisconsin travel corridor. The second bridge at Dubuque is the Julien Dubuque crossing which is a two-lane, free facility in generally good condition.

Seven alternate Mississippi River Bridge Construction Programs were studied for the Dubuque area. Each proposal assumed construction of a U. S. Route 20 Bypass Bridge immediately south of Dubuque and either a new Eagle Point Bridge, a Mid-Town Bridge, a City Island Bridge or a combination thereof. The various programs also explored the relative feasibility of new bridge construction assuming imposition of tolls on the Julien Dubuque crossing or its continuing as a free facility.

The alternate proposal which showed the highest level of financial feasibility was the condition whereby a new Eagle Point Bridge and a U. S. Route 20 Bypass Bridge would be constructed and that tolls would be imposed on the present Julien Dubuque Bridge. A 1.70 coverage of level debt service by average annual net revenues was determined; considerably above the 1.50 normally considered indicative of financial feasibility.

The next most attractive bridge program was construction of a two-lane City Island Bridge and a U. S. Route 20 Bypass and imposition of tolls on the Julien Dubuque Bridge. The level debt service coverage by average annual net revenues for this proposal was 1.40. If a four-lane rather than two-lane City Island Bridge were constructed as part of the above program, the coverage would decrease to 0.97.

INTRODUCTION

Dubuque, the fourth fastest growing city in Iowa, is the largest urban area located on the Mississippi River between La Crosse, Wisconsin, to the north and Davenport, Iowa, to the south. As shown in Exhibit 1, five U. S. Route designated highways serve the Dubuque area, of which three span the Mississippi River via two present crossings, the Eagle Point and the Julien Dubuque Bridges.

North of Dubuque, the closest Mississippi River crossing is the U. S. Route 18 Bridge at Prairie du Chien. The Savanna-Sabula Bridge is the first crossing to the south.

Authority and Purpose of Report

In December, 1967, the Iowa State Highway Commission authorized the preparation of a preliminary feasibility report for possible new toll crossings in the Dubuque Tri-State Area. This report is one of several comparable bridge studies to be conducted as part of the Iowa Toll Bridge Program, in accordance with legislation enacted by the Iowa General Assembly, a copy of which is included in the Appendix. The various locations, along the Mississippi River, to be studied under this program are shown in Exhibit 2.

A copy of the federal legislation permitting the construction and operation of the present Eagle Point Bridge is included in the Appendix. Under this Law, collection of tolls is permissable for an indefinite period. The Appendix also contains a copy of the General Bridge Act of 1946, the federal law permitting operation of privately owned toll bridges, which limits the period of time during which a new bridge could be operated as a toll facility to 30 years.

Scope of Services

This report summarizes preliminary engineering, traffic and revenues and feasibility studies for proposed additional toll crossings of the Mississippi River in the Dubuque Tri-State Area. These studies included:

1. Analysis of the physical limitations imposed by navigational requirements, terrain, existing levees, railroads, real property values, and the present street and highway network.

2. Comparison of alternative bridge and approach road locations based on estimates of project cost and annual maintenance and operating expenses.

3. Analysis of the adequacy of present trans-river traffic service in the vicinity of the proposed bridges, measured against present travel demands and anticipated future growth.

4. Development of preliminary traffic estimates for the various alternative alignments and estimates of annual traffic and revenues for the recommended bridge locations, assuming operation as toll facilities.

5. Determination of the preliminary feasibility of the bridge projects, based on the relationship of anticipated project costs and estimated toll revenues.

The engineering, location and cost studies relating to the proposed bridges were prepared by Howard, Needles, Tammen & Bergendoff and are discussed in Part I of this report.

Part II, prepared by Wilbur Smith and Associates, discusses the preliminary traffic and revenue potential of the crossings and the project feasibility calculations.

Present Highway System

The major east-west route through Dubuque is U. S. Route 20, an important through highway connecting Chicago to Iowa and points west. It crosses the Mississippi River via the Julien Dubuque Bridge. Through Dubuque, U. S. Route 20 follows Dodge Street.

U. S. Route 52 and Iowa Route 3, follow the same alignment into Dubuque, entering the city on Central Avenue and joining U. S. Route 61-151 at East 20th Street. The route then proceeds southerly through the Central Business District as a one-way pair between Dodge Street and East 21st Street. Southbound traffic utilizes Central Avenue and Bluff Street and northbound traffic, Locust and White Streets.

South of U. S. Route 20, U. S. Routes 52, 61 and 151 leave the Central Business District along Locust Street and Kerrigan Road, via a four-lane highway, to Bellevue Road where U. S. Route 52 proceeds in a southeasterly direction. Eventually, U. S. Route 52 crosses the Savanna-Sabula Bridge into Illinois. U. S. Routes 61 and 151 are the most direct routes to Davenport and Cedar Rapids, respectively.

Wisconsin traffic enters the Dubuque area primarily on U. S. Route 61-151 which is routed over the Eagle Point Bridge. Traffic enters the city on Rhomberg Avenue and East 20th Street.

Planned Highway Improvements

Primary programmed highway improvements in the influence area of the Dubuque bridges include the reconstruction of U. S. Route 61-151 in Grant County, Wisconsin, to a dual freeway from Dubuque to Dickeyville. U. S. Route 61 is scheduled for resurfacing and widening to 24 feet in 1972 from Dickeyville north to Lancaster.

Planned highway improvements in Jo Daviess County, Illinois include right-of-way acquisition for reconstruction of U. S. Route 20 from Illinois Route 84 to a point east of Galena, a distance of five miles. In Dubuque County, reconstruction of U. S. Route 151 is proposed from Cascade to the junction of U. S. Route 61. North of Dubuque, U. S. Route 52, from Iowa Route 3 to the Clayton County line is programmed for reconstruction.

Current comprehensive planning for the Dubuque area includes conversion of U. S. Route 20 to a limited access highway. Such consideration is consistent with Iowa State Highway Commission plans to upgrade U. S. Route 20 to limited access standards from Sioux City to Dubuque. The suggested alignment in the eastern part of Iowa would pass to the south of Dyersville and cross the Mississippi River, south of Dubuque. Dubuque area planning also reflects consideration of the construction of a new north-south freeway extending from Kerrigan Road to Couler Valley along an alignment serving both the Central Business District and Central Industrial District and completion of a regional highway from the location of a new Eagle Point Bridge to the north-south freeway. An industrial district highway, proposed from Kerper Boulevard Extension to Jones Street, is also under consideration. Provision of each of these improvements is proposed in a planning and zoning program report prepared in 1968 for the Dubuque County Metropolitan Area Planning Commission.

Present Eagle Point Bridge

The existing Eagle Point Bridge is a simple span through-truss structure built in 1902. The eastern portion of the bridge was reconstructed in 1935. Its roadway width varies from 17 feet through the main spans to 20 feet on the reconstructed spans. The main span over the river navigation channel is 376 feet 4 inches in length. Although this span is less than the normal minimum requirement of 400 feet, it is adequate due to the proximity of Lock & Dam No. 11, which has a horizontal clearance of 276 feet. The vertical clearance of the Eagle Point Bridge is 49.4 feet above extreme high water.

A weight limitation of 10 gross tons is currently in effect on the bridge. Semi-trailer trucks are prohibited from using the structure and the restriction is effectively enforced.

The Eagle Point Bridge, operated by the Dubuque and Wisconsin Bridge Company, carries U. S. Route 61-151 across the Mississippi River. The Iowa approach is along Rhomberg Avenue which parallels the river to the bridge-

head, at which point a 90 degree turn is required to enter the bridge. As shown in Exhibit 3, the bridge toll booth is located just before the right-angle turn onto the bridge. At approximately mid-river, there is a sharp change in alignment on the structure; this is also shown in Exhibit 3. The Wisconsin approach is good with adequate access provided to U. S. Route 61-151 northbound and Wisconsin Route 35, southbound.

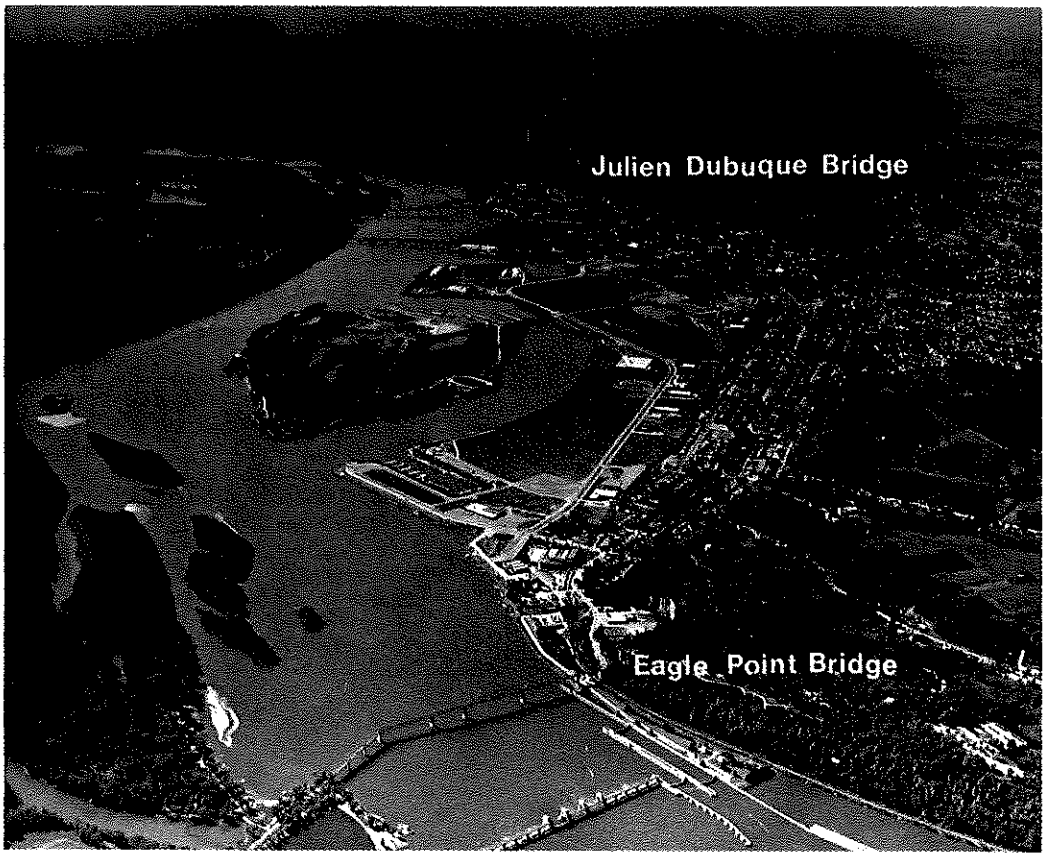
The present toll schedule on the Eagle Point Bridge, shown in Table 1, is based on a passenger car toll of $0.15. The fare for a passenger car with two or more occupants is $0.25; two-axle trucks pay proportionately higher tolls while larger trucks are banned from using the bridge.

TABLE 1

PRESENT TOLL SCHEDULE
Eagle Point Bridge

VEHICLE TOLL CLASS	TOLL
Passenger Car	
Driver only	$0.15
Two or more occupants	0.25
Hauling one-axle trailer	0.35
Hauling two-axle trailer	0.35
Hauling cabin trailer	0.50
Hauling house trailer	1.00
Bus	1.00
Two-Axle Truck	
1-2 Ton	0.50
Over 2 Tons	0.75
Semis (Prohibited)	5.00

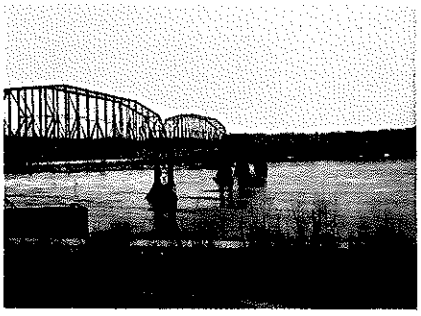
SOURCE: The Dubuque and Wisconsin Bridge Company.



PRESENT DUBUQUE BRIDGES

PHOTOGRAPH COURTESY OF TRI-STATE PHOTO DUBUQUE, IOWA

IOWA APPROACH — TOLL BRIDGE



VIEW OF BRIDGE STRUCTURE

PRESENT EAGLE POINT BRIDGE

Present Julien Dubuque Bridge

The Julien Dubuque Bridge is located 3.5 miles downstream from the Eagle Point Bridge. This high level, three-span, through-truss facility was built in 1943. The original Dubuque Bridge, built in 1887 and reconstructed in 1906, was located upstream from the present structure and adjacent to the existing Illinois Central Railroad Bridge. The present Julien Dubuque Bridge has a 24-foot roadway and a 5-foot sidewalk on the downstream side. Vertical clearance is 64 feet above normal pool elevation and horizontal clearance is 803 feet.

In 1967, this bridge, which carries the U. S. Route 20 designation, accommodated approximately 83 per cent of the total river crossing traffic in the Dubuque area. Ramps are provided on the Illinois side of the river for access to Illinois Route 35 and northbound traffic. The Iowa approach commences at the signalized intersection of Locust Street and Dodge Street, near downtown Dubuque.

Alternate River Crossings

The nearest alternate river crossing to the north of Dubuque is 69 miles north; the U. S. Route 18 Bridge at Prairie du Chien, Wisconsin. This high level, suspension bridge, constructed in 1932, operates as a free facility; the roadway width is 19 feet, providing two narrow travel lanes. Posted weight restrictions on the bridge limit commercial traffic as follows: two-axle single units cannot exceed 15 tons, three-axle single units cannot exceed 18 tons and all other combination units cannot exceed 23 tons.

The nearest river crossing to the south is the Savanna-Sabula Bridge, which provides unrestricted traffic service. This high level, three-span cantilevered through-truss bridge, opened to traffic in 1933, is located 44 miles southeast of Dubuque and is a toll crossing. The present toll schedule is shown in Table 2.

TABLE 2

PRESENT TOLL SCHEDULE

Savanna-Sabula Bridge

TOLL CLASS	TOLL
Passenger Cars	$0.35
House, Car, Farm Trailers (one or two axles)	0.20
Trucks or Bus	
Two-axle, four tires	0.35
Two-axle, six tires	0.70
Three-axle	0.85
Four-axle	1.00
Five-axle	1.25
Bicycles and Motorcycles	0.15
Farm Tractor	0.45
Pedestrians	0.10
Each additional axle	0.35

SOURCE: The Savanna-Sabula Bridge Company.

Previous Studies

All available pertinent data and reports relating to this project were assembled and reviewed. This material included information obtained from the Iowa, Wisconsin and Illinois Highway Commissions, other state agencies, and numerous county, municipal and other contacts.

PART I

LOCATION AND COST STUDIES

BASIC DATA

Considerable information regarding existing conditions and proposed improvements must be procured and analyzed in conjunction with the preparation of bridge studies for a project of this magnitude. The general features of the study area are shown on Exhibit I-1. The following are items of data pertinent to a Mississippi River crossing at Dubuque.

Geology

The bridge sites under consideration in the Dubuque, Iowa area are in the Driftless Section of the Central Lowlands Physiographic Province. The sites lie in the Mississippi River Flood Plain and are bounded by bluffs which, in places such as Eagle Point, show exposed cuts of loess and dolomite. In the areas of study, the bluffs consist of about fifteen feet of loess over bedrock. Well logs near the Julien Dubuque Bridge indicate the pre-glacial or inter-glacial channel of the Mississippi River to be filled with over 100 feet of silt, sand, and gravel alluvium.

Underlying the alluvium is the Galena–Platteville formation of the Ordovician System. This Paleozoic Epoch rock consists principally of dolomite and limestone with some sandstone and shale. Bedrock varies in elevation across the river as it rises toward the bluffs on the east and west sides of the river.

Substructure units for bridges in this area should be founded on bearing piles driven through the flood plain alluvial material to bedrock. Prior to final design, foundation borings and laboratory soil tests will be required for determining the need for and extent of any special embankment treatment required for stability and settlement purposes. The borings will also aid in defining bedrock elevations for selection of the most economical foundation design and construction.

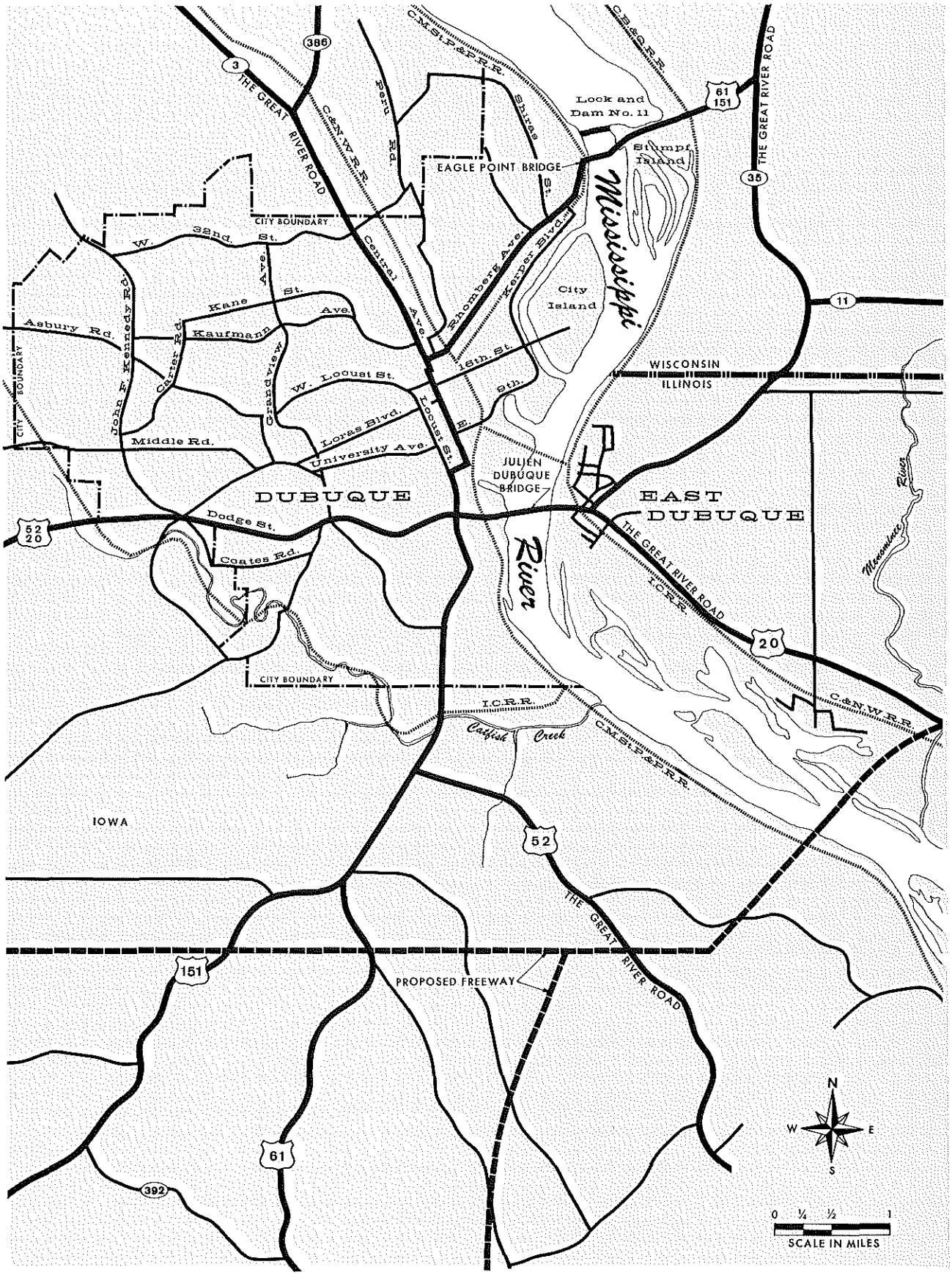


Exhibit I-1

DUBUQUE STUDY AREA

River Conditions

U.S. Lock and Dam No. 11 (The General Pike Dam), which is located immediately upstream from the Eagle Point Bridge, defines the position of the Mississippi River navigation channel north of Dubuque. The Illinois Central Railroad swing bridge and the Julien Dubuque Bridge define the navigation channel opposite the Central Business District of Dubuque. Between these points, the channel closely follows the state boundary line.

Normal pool elevation downstream from the lock and dam is 592.0 feet above Mean Sea Level, while the upstream normal pool elevation is 603.0 Mean Sea Level. The high water elevation (established in 1965) is 613.9 Mean Sea Level at the Eagle Point Bridge.

Existing Railroads

Four mainline railroads serve the Dubuque area: the Illinois Central; the Chicago and North Western; the Chicago, Burlington & Quincy, commonly known as the Burlington; the Chicago, Milwaukee, St. Paul and Pacific, commonly known as the Milwaukee. The Burlington Line runs parallel to the Mississippi River along its eastern bank at an elevation of 611± Mean Sea Level between the Eagle Point and the Julien Dubuque Bridges. The Milwaukee Line runs parallel to the Mississippi River along its western bank at an elevation of 609 ± Mean Sea Level between the Eagle Point and Julien Dubuque Bridges. These tracks are subjected to flooding during periods of extreme high water (Elevation 613.9 in 1965).

Navigation Clearances

Criteria for navigation clearances have been tentatively established by the Rock Island District of the U. S. Army Corps of Engineers.

Upon establishment of the Department of Transportation under the Act of 15 October 1966, PL 89-670, the Secretary of Transportation was given responsibility for certain functions, powers, and duties previously

vested in the Secretary of the Army and other offices of the Department of the Army, including those with respect to drawbridge operating regulations (Section 5 of the Act of 18 August 1894 as amended), obstructive bridges (the Act of 21 June 1940 as amended), and location and clearances of bridges and causeways in navigable waters (Section 9 of the Act of 3 March 1879, the Act of 23 March 1906 as amended, and the General Bridge Act of 1946 as amended, except Section 503).

The criteria cited herein is in conformance with the requirements and past practices of the U. S. Army Corps of Engineers. The assumption has been made, for this exploratory report, that the criteria to be established by the U. S. Coast Guard, the agency delegated by the Secretary of Transportation to assume the responsibility for the functions listed above, will be similar to those of the Corps of Engineers.

Contact with the Coast Guard has confirmed the validity of this assumption for an exploratory study of alternative locations. It should be noted, however, that the particular river conditions existing at each site should be reviewed with the Coast Guard prior to the preparation of a definite project report to establish the navigation requirements.

The minimum permissible navigation channel on the Mississippi River is 400 feet. This clearance is permitted only when the alignment of the river channel is straight. The opening must be greater where the alignment of the channel is curved under or upstream from the bridge.

Final approval of clearances can be determined only after formal application has been filed and public hearings conducted.

The minimum vertical clearance for a bridge structure is 52 feet above the 2 per cent waterline elevation, or 60 feet above flat pool whichever is higher. The 2 per cent waterline is that elevation of the river which will be exceeded only 2 per cent of the time. In the Dubuque area, low steel elevation required by the 2 per cent specification is 656.0 Mean Sea Level which exceeds Elevation 652.0 Mean Sea Level required by the flat pool specification. The present Eagle Point Bridge provides 59.0 feet of vertical clearance above the 2 per cent waterline elevation and 71.3 feet of vertical clearance above the flat pool elevation.

ALTERNATE LOCATIONS

General

Ten alternate bridge site locations, as shown on Exhibit I-2, were studied and evaluated for a Mississippi River crossing at Dubuque.

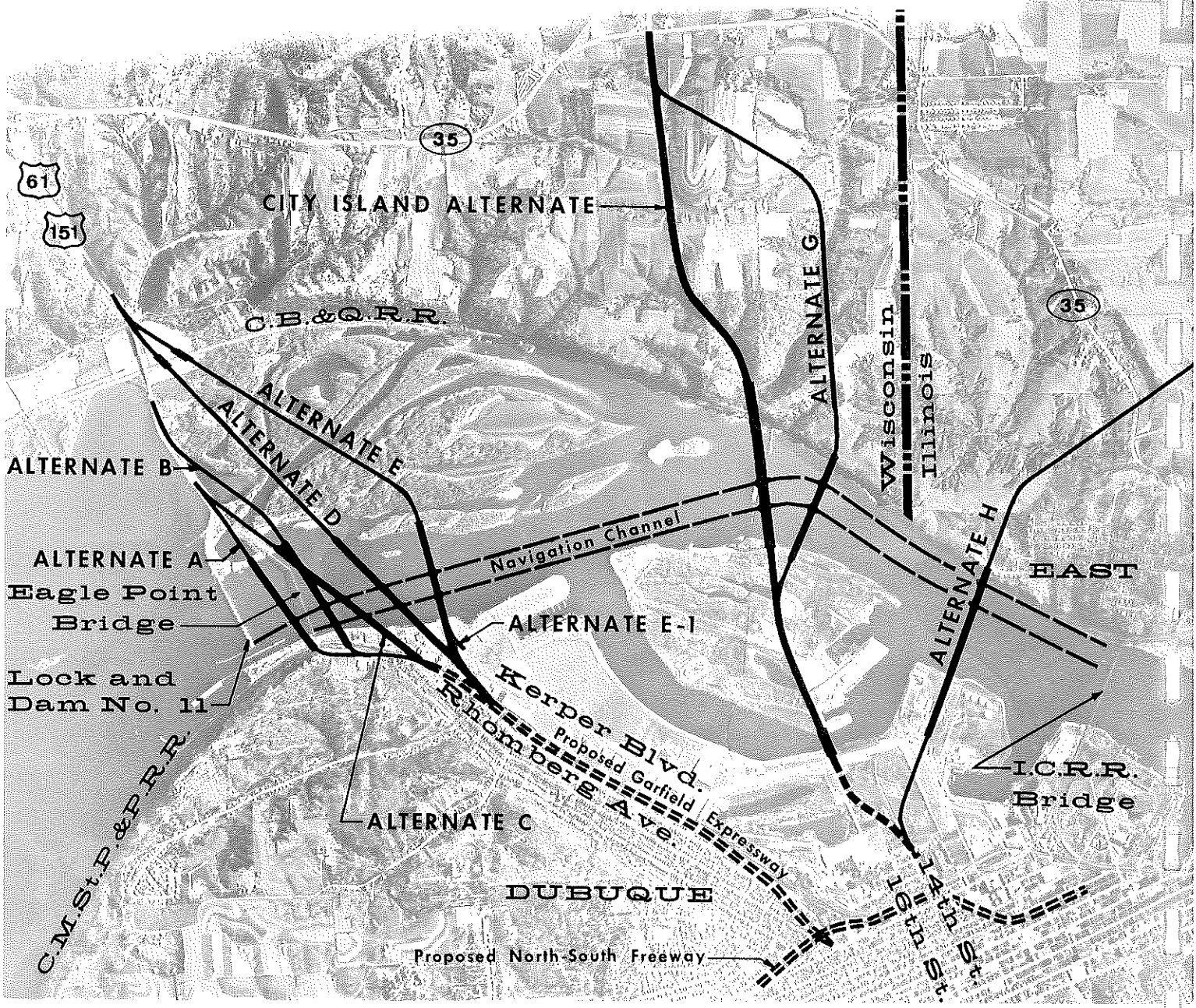
Three locations, Alternate A near the existing Eagle Point Bridge, the City Island Alternate, and the U.S. Highway 20 Bypass Alternate 4.5 miles south of Dubuque, were studied in detail for inclusion in this report.

Eagle Point Alternates

In Alternate A, the Iowa approach ties directly to Rhomberg Avenue as does the present bridge approach as shown on Exhibits I-2 and I-3. This alignment, incorporating a 10 degree horizontal curve on the Iowa approach to replace the severe right angle turn in the existing bridge approach, would require additional right-of-way on the Iowa approach and removal of a portion of the Eagle Point bluff. The major advantage to Alternate A would be its proximity to the existing bridge and Lock & Dam No. 11 necessitating only a 400 foot channel span, whereas all other alternates presented would require at least a 500 foot navigation channel span. A minimum of additional work would be required on the Wisconsin side of the river, where new embankment would be required for only 1/3 of a mile.

Alternate B begins at a point west of the C.B.&Q. Railroad in Wisconsin to a connection with Rhomberg Avenue in Dubuque. Alternate B utilizes the existing structure over the C.B.&Q. Railroad. The total cost of a new bridge on the Alternate B location would be greater than one at the location of Alternate A but less than at other locations in the vicinity of the existing Eagle Point Bridge.

The Iowa terminal of Alternate C with Rhomberg Avenue would be some 600 feet south of the point of the terminal of Alternate A or B, necessitating additional right of way along Rhomberg Avenue. This alternate retains the existing structure over the C.B.&Q. Railroad. The main span would probably be more than 500 feet in length.



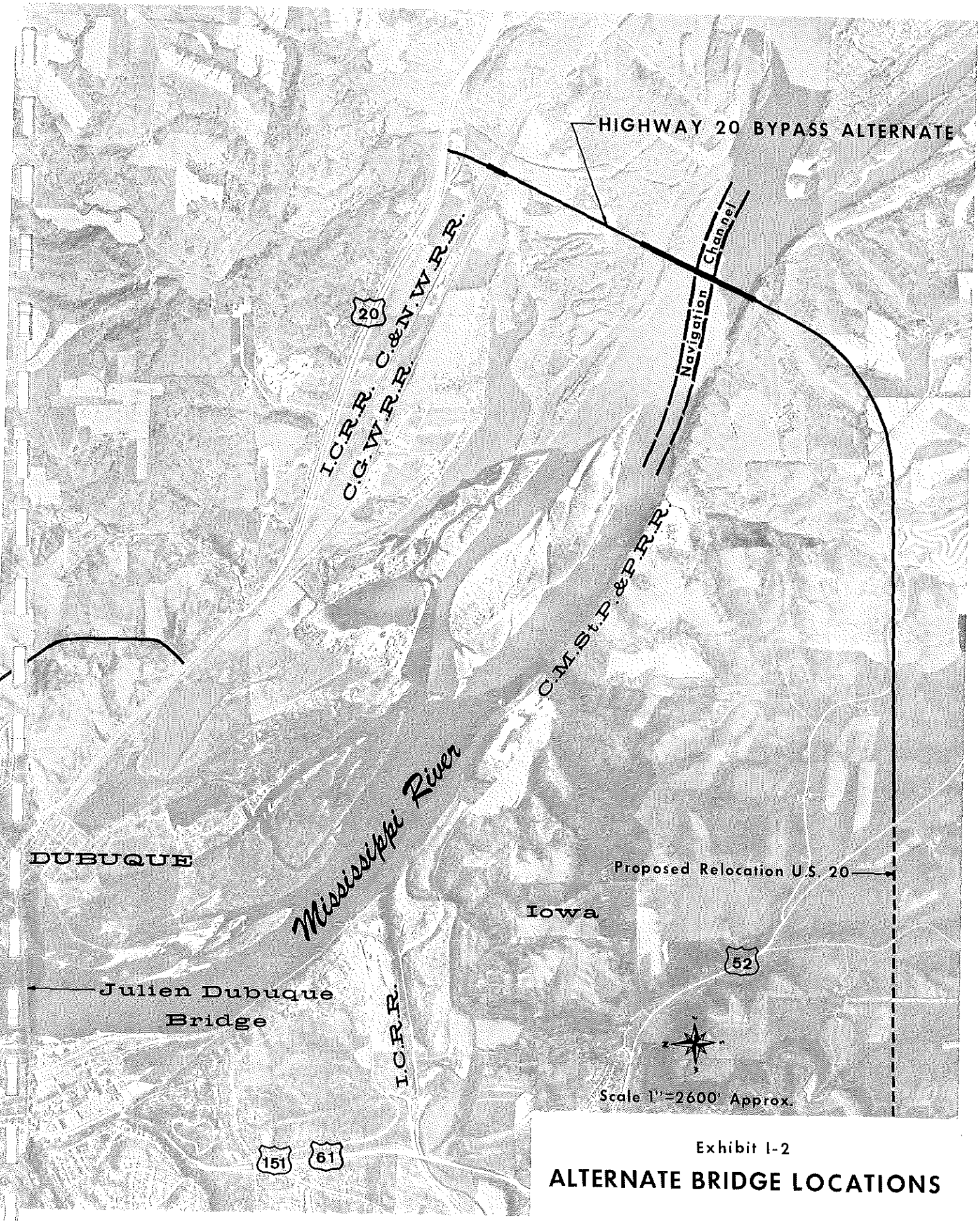


Exhibit I-2

ALTERNATE BRIDGE LOCATIONS

Alternate D has its Iowa terminal with the proposed Garfield Avenue Expressway, shown in Exhibit I-2. Although the principal advantage of this alternate is its direct alignment, its cost will be the greatest of all alternates studied.

Alternate E is compatible with the possibility of the development of a future expressway connection to the Central Business District and a connection to the future Couler Valley Expressway to the north. One possible location for such an expressway would be between Garfield Avenue and the C.M.St.P.&P. Railroad, providing an excellent Iowa approach to a new bridge and eliminating bridge traffic from Rhomberg Avenue, a residential street.

The main channel span would be at least 500 feet and the C.M. St.P.&P. Railroad would be bridged at a severe skew; a long overall structure length of 3500 feet would result, comparatively the structure length of Alternate A would be only 1970 feet. Alternate E would also necessitate a new structure for a grade separation with the C.B.&Q. Railroad on the Wisconsin approach.

Alternate E-1, Exhibit I-2 differs from Alternate E only in its Iowa terminal connection. It connects directly to Kerper Boulevard, an industrial street extending the length of the Dubuque riverfront industrial park. The resulting truck traffic on Kerper Boulevard would be a disadvantage of this scheme.

Dubuque Riverfront Industrial District Alternates

The City Island Alternate, shown on Exhibits I-2 and I-4, is the primary midtown location. This alternate has its beginning with a channelized intersection with Kerper Blvd. and connects temporarily to 16th Street; at some future time it would tie directly to the North–South Freeway via either 14th or 16th Street. A new structure would be necessary

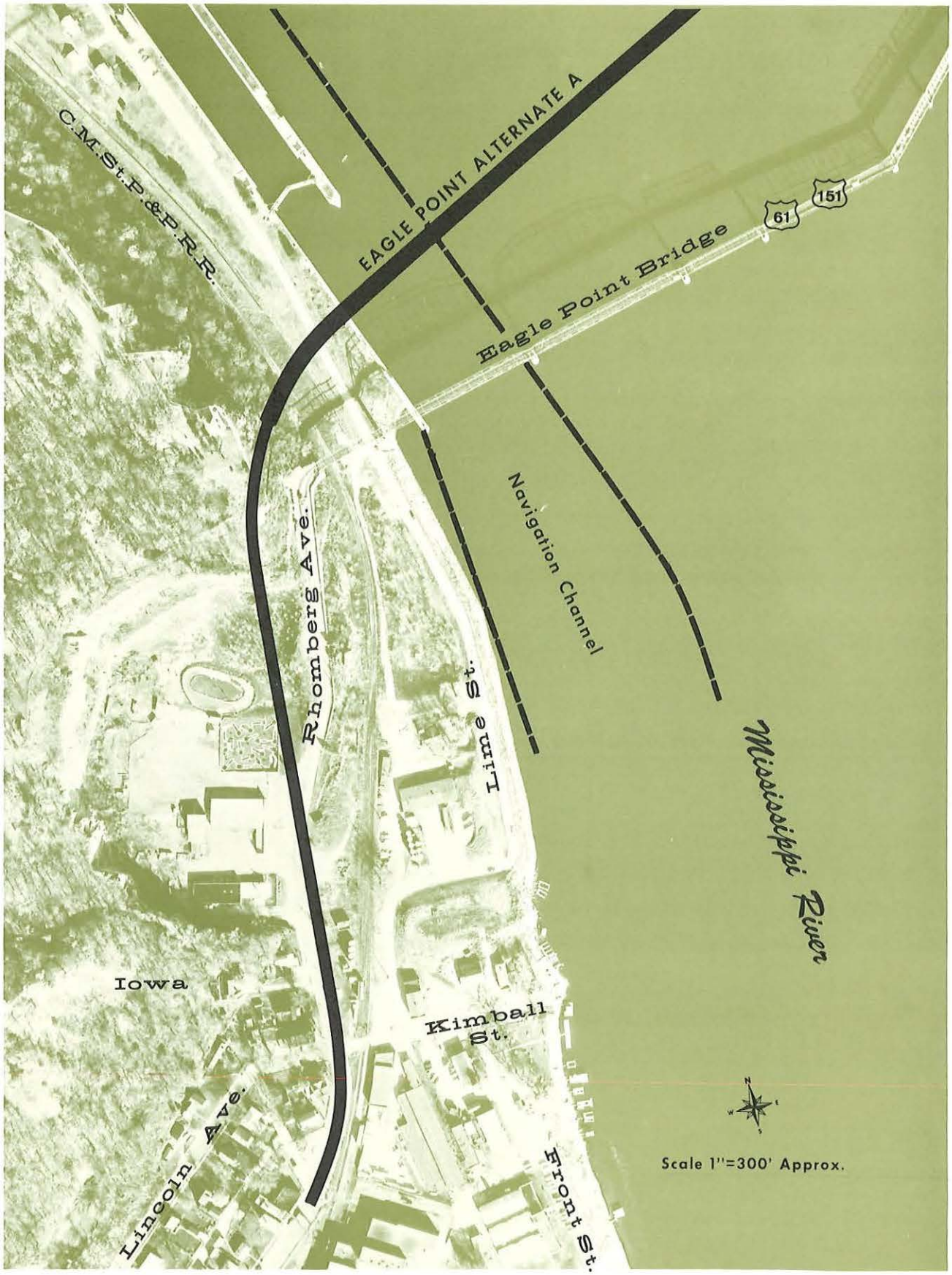


Exhibit I-3

DUBUQUE TERMINAL—EAGLE POINT ALTERNATE A

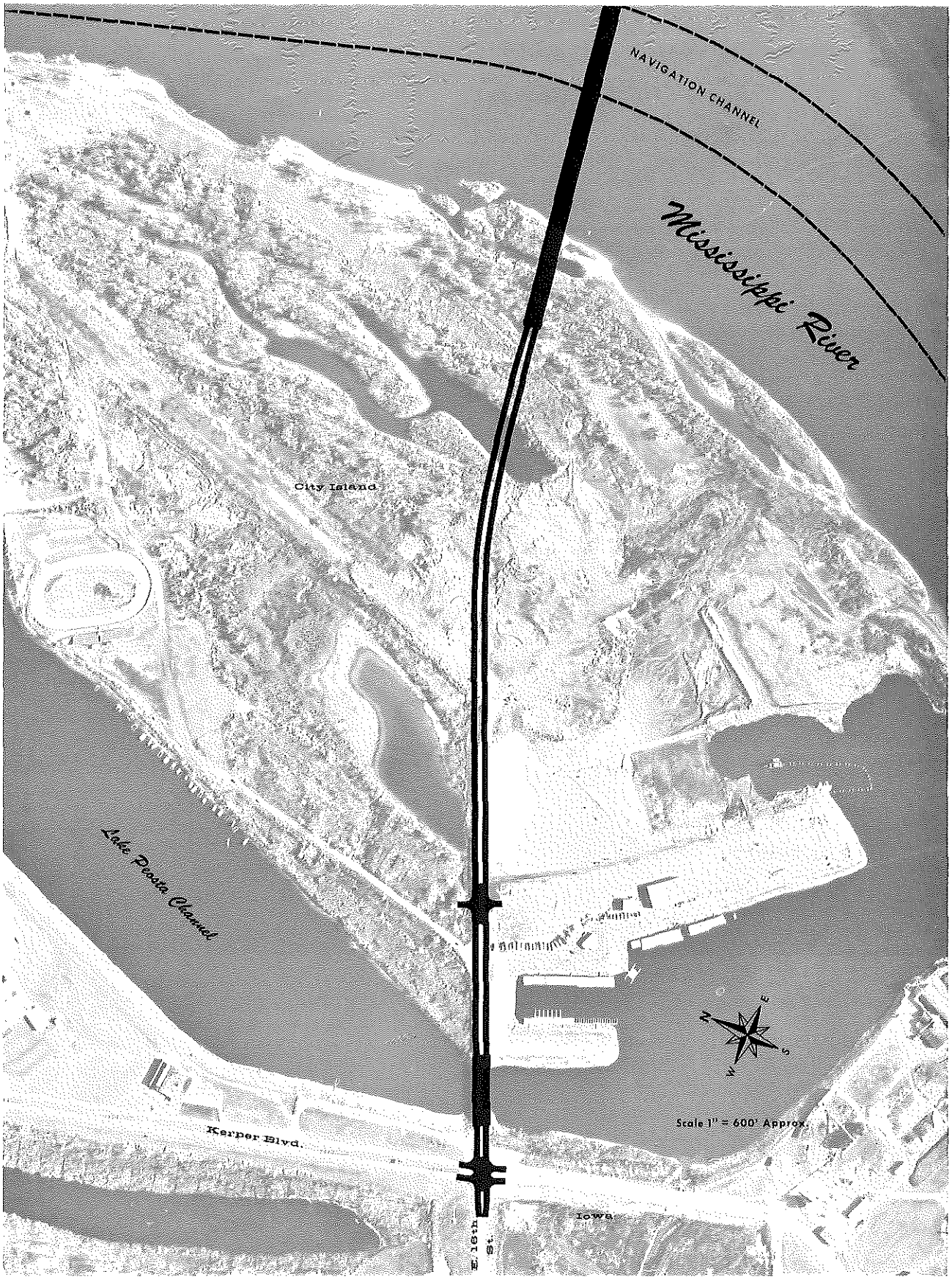


Exhibit I-4

DUBUQUE TERMINAL-CITY ISLAND ALTERNATE

over the Peosta Channel, providing only low level clearance. Access to City Island would be maintained by a simple tee intersection located as shown on Exhibit I-4; at some future date a more elaborate interchange could be included at this location as development on the Island warrants. The toll booth can easily be positioned approximately 1000 feet west of the west end of the main river structure. A 3.0 per cent grade has been utilized from City Island over the navigation channel; a 2.5 per cent down grade is required to just clear the C.B.&Q. Railroad and the Boatyard Hallow drainage channel on the Wisconsin shore. A 5.0 per cent grade is necessary to bring the approach to its eastern terminal, where Wisconsin Route 11 intersects Wisconsin Route 35. The terrain for the Wisconsin approach is difficult at best and roadway construction costs for this alternate reflect this difficulty.

The City Island Alternate would provide convenient direct access to downtown Dubuque from Wisconsin as well as offering opportunity for the industrial development of City Island as well as that of the Dubuque riverfront area.

Alternate G crosses the river 1200 feet downstream from the City Island Alternate and differs from that alternate only in its Wisconsin approach which, although circuitous, provides better grades; the navigation channel is crossed at approximately a right angle and a shorter river structure is necessary. The Wisconsin terminal for this alignment is again the intersection of Routes 11 and 35 one mile north of the Wisconsin–Illinois border.

The primary advantage of this alternate would be the direct traffic service to the riverfront industrial area. The major disadvantage is the high bluff and difficult terrain traversed on the Wisconsin side of the river. Provision of acceptable grades in this terrain without incorporating a circuitous horizontal alignment is most difficult. However, the alignment as shown on Exhibit I-2 is within acceptable highway design standards.

Alternate H location would connect East Dubuque on the Illinois side of the Mississippi River to Dubuque on the Iowa side 1/2 mile upstream

from the existing Illinois Central Railroad Bridge. This alternate, which would provide an at grade intersection with Kerper Boulevard in the Dubuque riverfront industrial park, terminates at an interchange with the proposed future north–south freeway. The terrain on the Illinois side of the river is composed of high bluffs and provision of desirable horizontal and vertical alignments is difficult to attain. A combination of acceptable grades and horizontal curves, however can be used to effect a suitable connection to State Route 35 and to Highway 20 in Illinois as shown on Exhibit I-2.

Highway 20 Bypass Alternate

The Highway 20 Alternate location, shown on Exhibits I-2 and I-5 is located approximately 4.5 miles south of Dubuque in conformance with the preliminary studies previously prepared by the Iowa State Highway Commission for upgrading this important east–west highway to a limited access route across Iowa. The approach roadway in Iowa extends from U.S. Route 52 to the Mississippi River. In Illinois, the east roadway approach would extend from the river to a connection with existing U.S. Route 20.

Although the alignment and grade (3 per cent descending from west to east across the river) of this alternate are desirable, and right-of-way requirements are substantially less than the other considered alternatives, the approach roadway cost requirements for this alternate must be considered a major disadvantage.

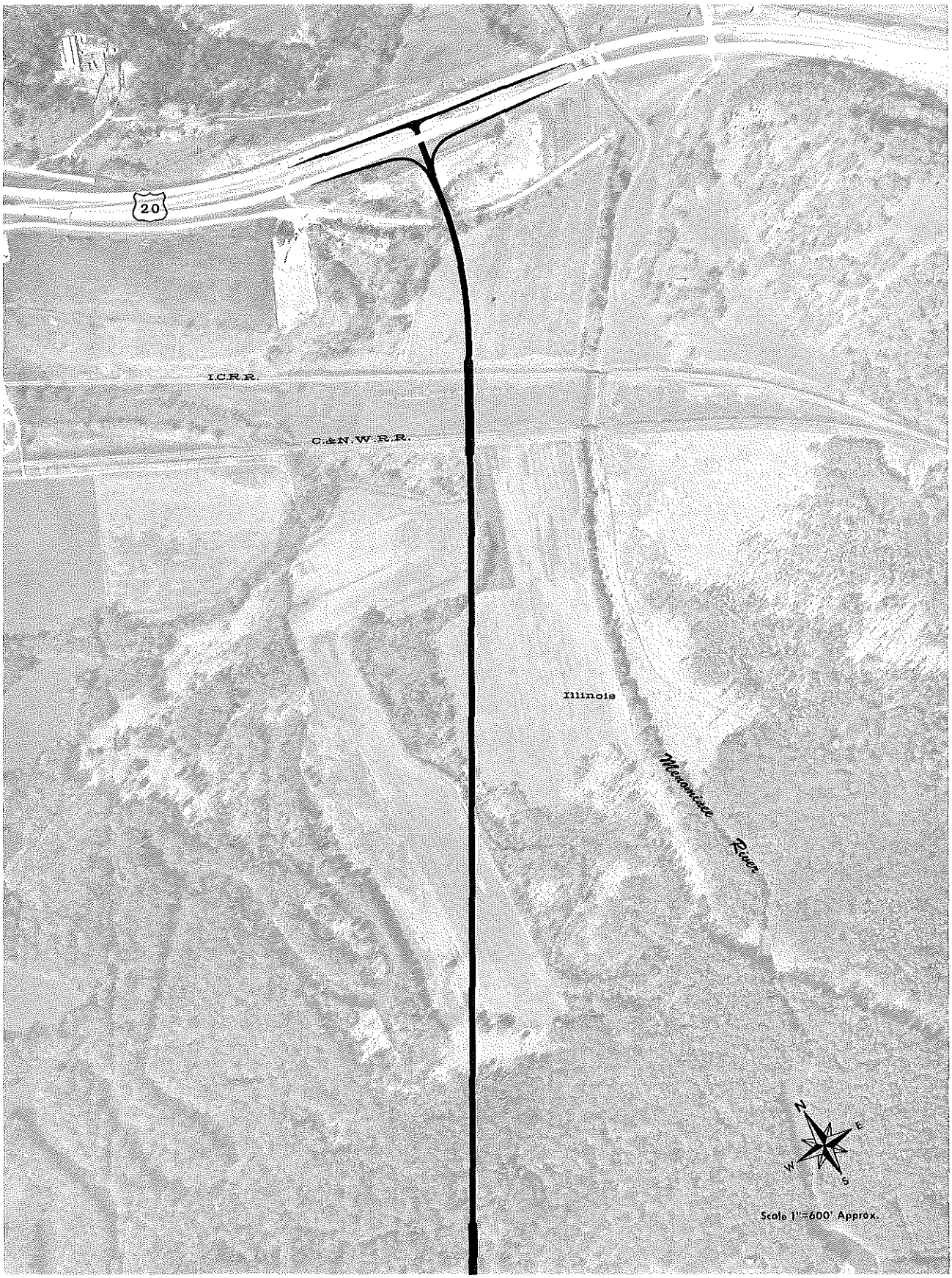


Exhibit I-5

ILLINOIS TERMINAL-HIGHWAY 20 BYPASS ALTERNATE

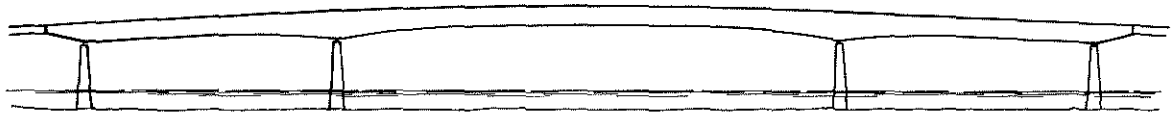
STRUCTURE TYPE STUDIES FOR NAVIGATION SPANS

The primary intent of structure type studies as a part of this exploration study is to determine the approximate cost of a river crossing. A final recommendation for a specific type of structure cannot be made at this stage of investigations and design. The final selection of a structure type will be contingent upon economics, aesthetic factors, structural considerations, navigational clearance requirements, foundation conditions, highway alignment and vertical controls. All of these control factors would be studied in detail after a preliminary selection of bridge location has been made, based on the general considerations outlined and discussed in this report.

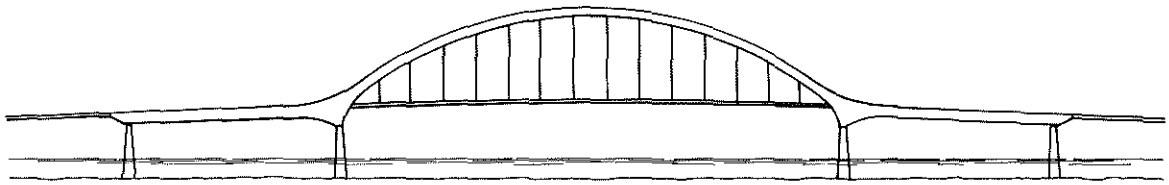
Six types of navigation spans are shown on Exhibit I-6. Type I is a Continuous Girder Span. These contemporary structures are popular because of economics, pleasing appearance and the elimination of obstructions above the roadway. Economic considerations usually limit spans to less than 450 feet, but with increased usage of newer high-strength steels current maximum span lengths may be economically increased. Since structure depths of the girder span are relatively greater than of other structure types, the practicality of the girder span will be dependent upon navigational clearances, existing topography, and approach grades.

Type II navigation span of Exhibit I-6 is a Continuous Box Girder Tied Arch Span with flexible tie. The tie resists only the thrust of the arch. Without a tie the resistance would have to be provided by river piers. This type of span is considered very practical construction for bridges over the Mississippi River if navigation clearance requirements are limited to a single opening. This type of structure has a very limited depth between the low steel and roadway deck and will, therefore, permit flatter approach grades than a continuous girder design.

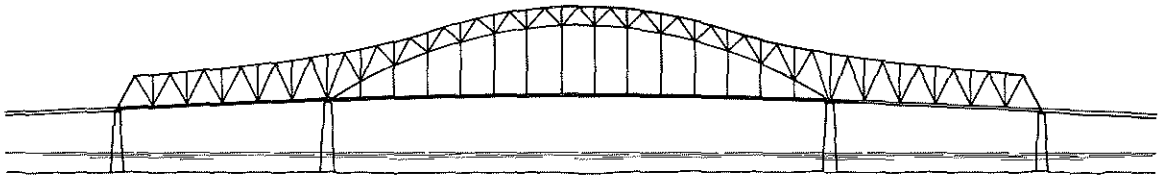
Type III navigation span is the Continuous Truss Tied Arch Span. This type of bridge is similar in structural function to Type II, the box girder arch. The difference being that a steel truss system is used for the arch rib and approach spans instead of box girder sections. This type of struc-



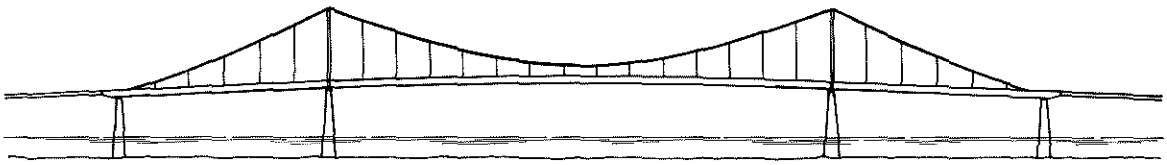
CONTINUOUS GIRDER SPAN — TYPE I



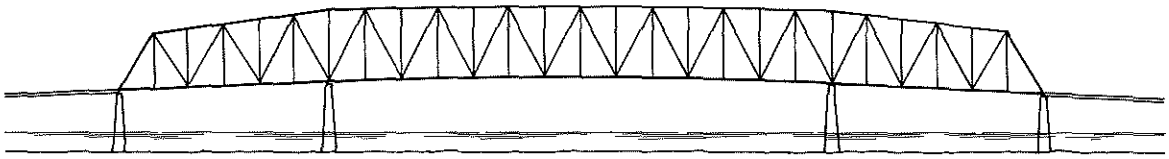
CONTINUOUS BOX GIRDER TIED ARCH SPAN — TYPE II



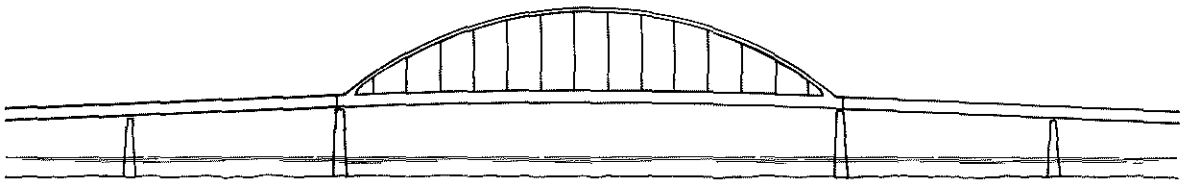
CONTINUOUS TRUSS TIED ARCH SPAN — TYPE III



SELF ANCHORED SUSPENSION SPAN — TYPE IV



CONTINUOUS TRUSS SPAN — TYPE V



BOX GIRDER TIED ARCH SPAN — TYPE VI

Exhibit I-6

NAVIGATION SPAN STRUCTURE TYPES

ture will be economical for longer spans than the box girder and, with proper proportions, can be aesthetically pleasing.

The suspension bridge is considered one of the most graceful of all bridge structures. The Self Anchored Suspension Span is shown as Type IV. This type of structure generally costs more, up to 20 per cent, than other considered types when the maximum span required is in the 500 to 600 foot range. It offers advantages of pleasing appearance, flatter approach grades and nearly equal vertical clearance in the side spans.

A Continuous Truss Span is shown as Type V. This is a common and economical type of structure. In the past it was particularly popular because of economy in total metal required, its truss members being fabricated from many small pieces of structural steel with rivets. Modern steel technology, by providing larger sizes of structural steel plates, has permitted the designer to develop other types of structures that are aesthetically pleasing and yet are competitive in cost with the continuous truss.

The navigation span identified as Type VI is the Box Girder Tied Arch Span. Side spans will be of continuous girder construction but will function independently of the center span. The tie in the center span is more rigid in comparison with the arch than the flexible tie of Type II. The depth of the tie girder is shallower than the depth of the Continuous Girder Span, Type I. Thus, if vertical clearance requirements would cause excessive approach grades to a Continuous Girder Span, the Box Girder Tied Arch Span offers an advantage. This type of structure is aesthetically pleasing and economical for two-lane roadways for a navigational span greater than 400 feet.

It appears that there would be little, if any, significant difference between the combined costs of fabrication and erection of a tied arch span and a continuous truss span. Decreased erection costs favor the truss span; however, this advantage is offset by lower fabrication costs for the arch. The latter has fewer members since the bridge steel is concentrated in the arch rib and tie. In summary, the continuous girder bridge is suitable when length of approaches allow desirable grades to be used; its

cost is comparable with several other bridge designs. The continuous girder bridge with tied arch main span and box girder bridge with tied arch main span combine a pleasing appearance with economy of construction for the length of span required for a bridge at this site. The continuous truss bridge and continuous truss bridge with tied arch main span, while competitive in construction cost with the girder bridges, are not as attractive. The self anchored suspension span is uneconomical for the span lengths being considered for this project.

Inasmuch as more detailed estimates of construction cost would be developed in subsequent phases of design, a structure type other than the type recommended herein may prove to be more economical upon subsequent refinements in design. The probable variation in costs among the various structure types considered herein is within the accuracy of estimating at this stage of design.

The Box Girder Tied Arch Span Type VI, also shown in a general setting on Exhibit I-7, should be given thorough consideration in future engineering studies for a highway crossing at Dubuque, Iowa.

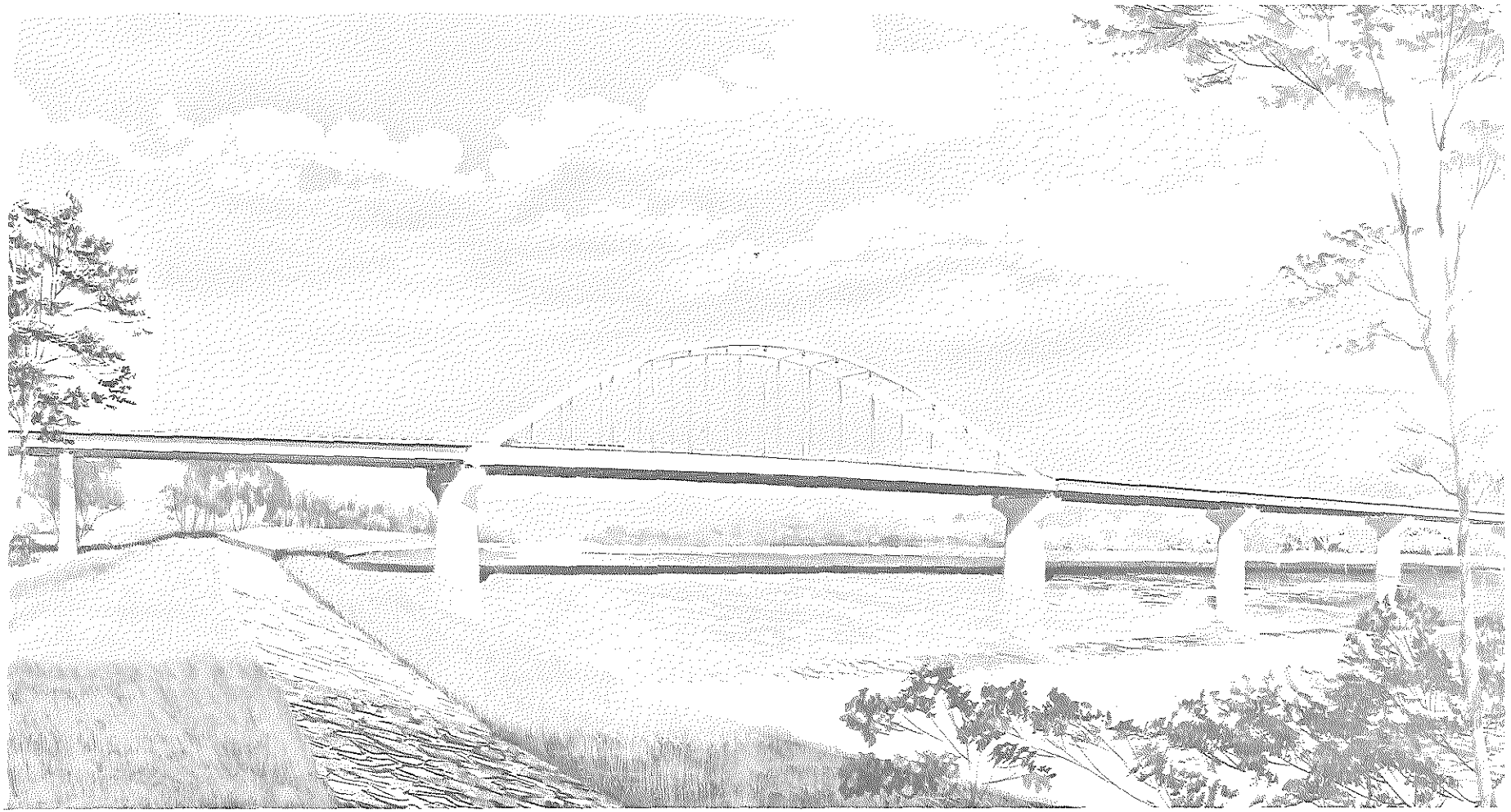


Exhibit I-7

BOX GIRDER TIED ARCH SPAN

STRUCTURE TYPE STUDIES FOR APPROACH SPANS

Economy is a primary consideration for the approach spans which extend from the bridge abutments to the main river unit. Many types of approach span construction can be blended with the main span design to achieve a pleasing appearance. However, a final layout of the most economical span lengths cannot be determined until subsurface investigations have been completed. Prestressed concrete beam spans utilizing Iowa standard design beams would offer economical construction in the river bottoms where pier foundations would not be subject to scour action of the river. These beams are usually limited in length to 80 feet. As the bridge extends into the river, the cost of piers becomes greater. To offset the increased pier cost, longer spans would be used. Steel girders with floorbeams and intermediate stringers offer the greatest economy of construction for spans greater than 80 feet.

COST ESTIMATES

General

The preliminary roadway costs were determined by applying current unit prices to preliminary quantity estimates of the principal roadway construction items. Allowances have been included for modest escalations of unit costs during the one year that will elapse before construction could begin.

Right-of-way cost estimates were based upon fair market valuations of all real property involved. Allowances have been included for damages, severance losses and acquisition expenses.

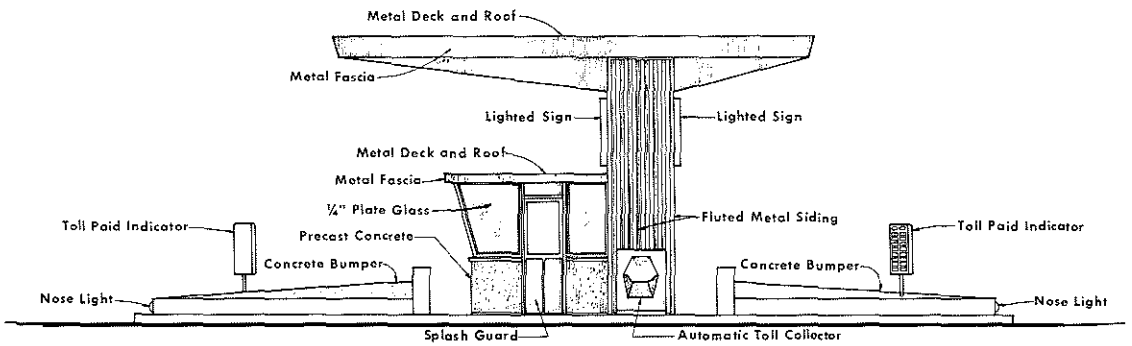
A typical toll booth installation is shown on Exhibit I-8, for the Eagle Point Alternate A and Highway 20 Bypass Alternate, and Exhibit I-9 is typical for the City Island Alternate. The exact location of these toll facilities on the bridge approaches will be established during subsequent study phases.

Prior to preparation of final design plans, additional engineering studies will be required. A complete subsurface investigation will be necessary to provide a firm basis for the determination of substructure type, substructure designs and economical span lengths. Main river unit studies will include economic comparisons of several types of construction.

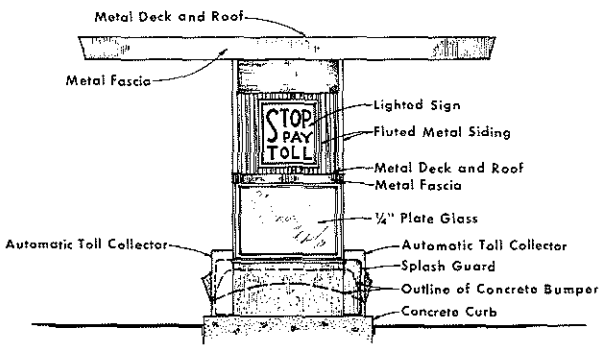
The total project cost does not include any allowance for acquisition of any franchise rights or property now vested in the private toll bridge company, but does include the cost of the removal of the existing Eagle Point Bridge upon completion of a new bridge.

Eagle Point Alternate A

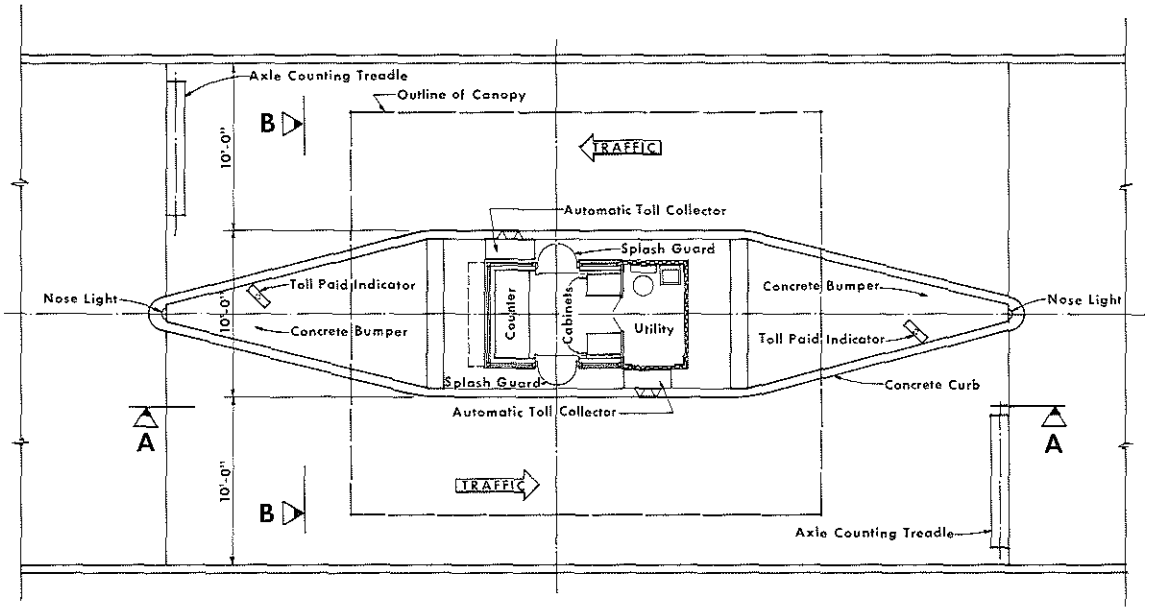
A plan, elevation and typical section for the Eagle Point Alternate A is shown on Exhibit I-10. The 32-foot roadway width provides 4 feet 6 inches of lateral clearance between the righthand edge of a typical



ELEVATION A-A



ELEVATION B-B



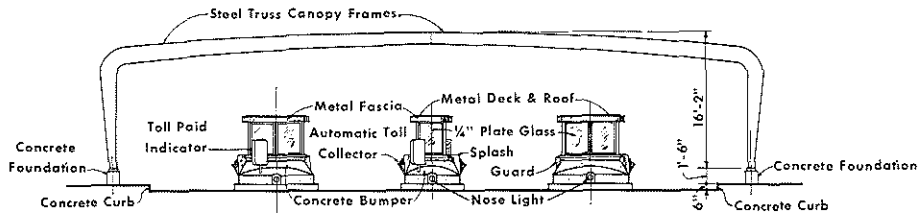
PLAN

5 0 5 10 15

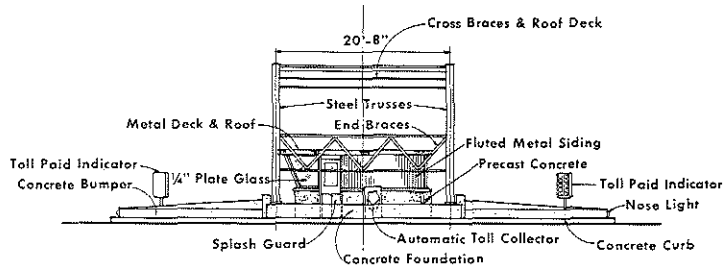
SCALE IN FEET

Exhibit I-8

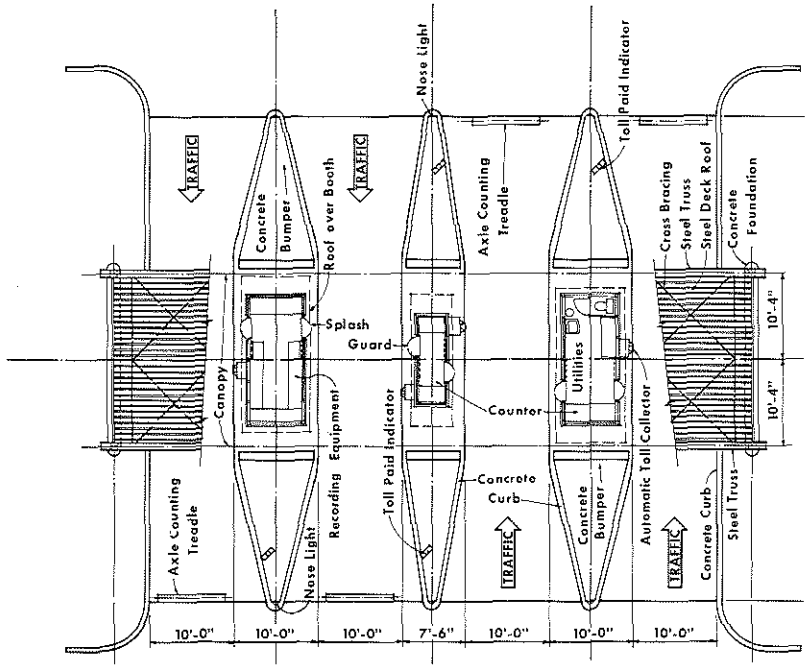
GENERAL PLAN AND ELEVATION
TOLL BOOTH



FRONT ELEVATION



SIDE ELEVATION



PLAN

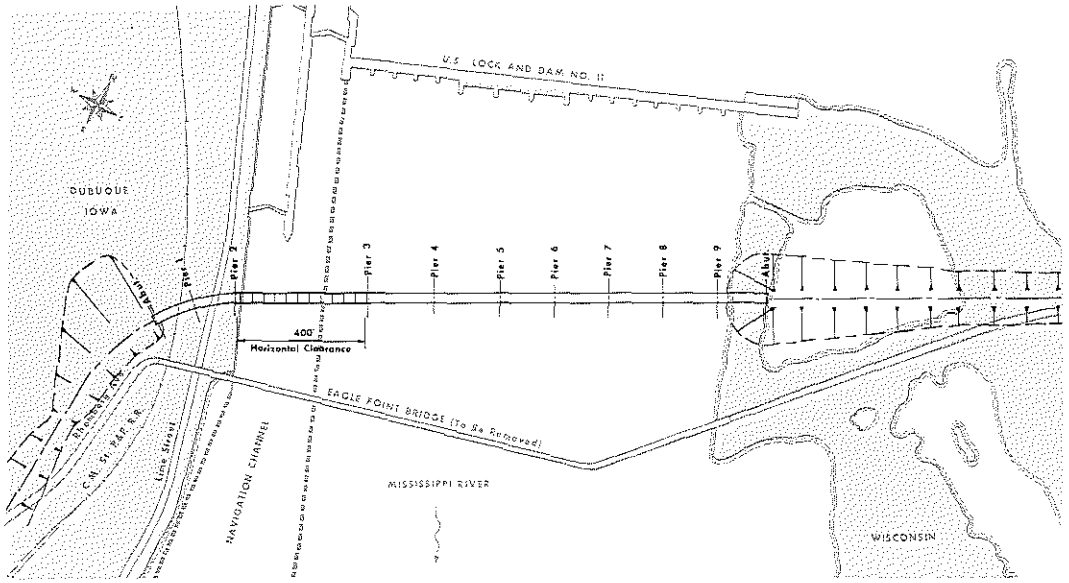
5 0 5 10 15

SCALE IN FEET

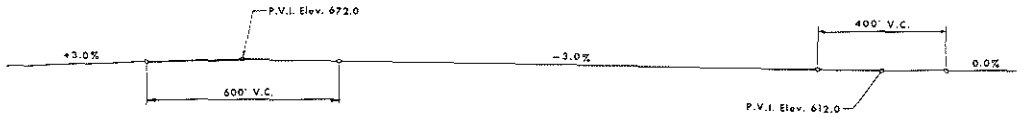
Exhibit I-9

GENERAL PLAN AND ELEVATION

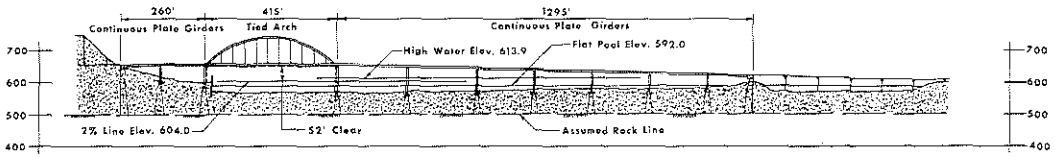
TOLL PLAZA



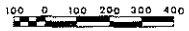
PLAN

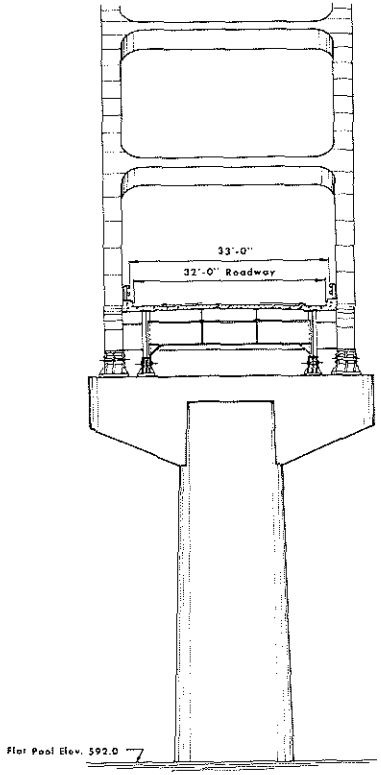


PROFILE GRADE



ELEVATION





SECTION THRU PLATE GIRDER SPAN
NEAR CHANNEL PIER

Exhibit I-10

EAGLE POINT ALTERNATE A LOCATION

GENERAL PLAN AND ELEVATION

12-foot traffic lane and the barrier rail. This clearance from the normal edge of the lane conforms to the modern safety requirements of the American Association of State Highway Officials and the Bureau of Public Roads. There are few pedestrians crossing the river; therefore, sidewalks will not be necessary and have not been provided.

A navigation span of 415 feet permits a 400 foot navigation channel as will probably be required at this site. A Box Girder Tied Arch Span is shown on Exhibits I-6 and I-7. This aesthetically pleasing structure allows desirable approach grades and its cost will compare favorable with other types of spans.

The estimated construction cost of the bridge at the Eagle point location is $2,417,000. A detailed breakdown of this cost is shown in Table I-1. Quantities shown are based on a preliminary design of all structural components.

Details of the total estimated project cost for the Eagle Point Alternate A are shown in Table I-4.

City Island Alternate

Consideration has been given to alternate design of the City Island Alternate as a two lane facility and as a four lane facility.

A 1985 estimated ADT of 6670 vehicles – if the Julien Dubuque Bridge remains a free bridge and the Eagle Point Bridge is removed – is assigned to this location in Part II of this report. This volume of traffic may be conveniently accommodated on a two lane bridge.

However, several conditions suggest a four lane bridge would be more suitable:

1. If tolls are reimposed on the Julien Dubuque Bridge – or if all river crossings are toll free – the average daily traffic on the City Island Alternate would increase to over 11,000 vehicles. This volume warrants a four lane facility.

TABLE I-1

ESTIMATE OF BRIDGE CONSTRUCTION COST

EAGLE POINT ALTERNATE A

Dubuque, Iowa, Bridge

Continuous Girder Spans	260 ft.
Box Girder Tied Arch Span	415 ft.
Continuous Girder Spans	1,295 ft.
	1,970 ft.

Roadway Width - 32' - 0" Curb-to-Curb

ITEM	QUANTITY	UNIT PRICE	COST
Superstructure:			
Bridge Railing	3,980 L.F.	$12.00	$ 47,800
Concrete	1,820 C.Y.	90.00	163,800
Reinforcing Steel	547,000 Lbs.	0.14	76,600
Tied Arch Steel A-36	850,000 Lbs.	0.34	289,000
Tied Arch Steel A-441	940,000 Lbs.	0.38	357,200
Girder Steel A-36	689,000 Lbs.	0.29	199,800
Girder Steel A-441	1,333,000 Lbs.	0.32	426,600
Cast Steel and Misc. Metal	72,000 Lbs.	0.70	50,400
Navigation Lighting	—	Lump Sum	20,000
	SUBTOTAL		$1,631,200
Substructure:			
Concrete	5,200 C.Y.	$65.00	$ 338,000
Reinforcing Steel	520,000 Lbs.	0.14	72,800
Steel Bearing Piles (12BP53)	14,280 L.F.	8.00	114,200
Steel Bearing Piles (14BP73)	6,860 L.F.	10.00	68,600
Steel Pile Cofferdams	28,830 S.F.	5.00	144,200
Excavation	4,800 C.Y.	10.00	48,000
	SUBTOTAL		$ 785,800
	TOTAL BRIDGE COST		$2,417,000

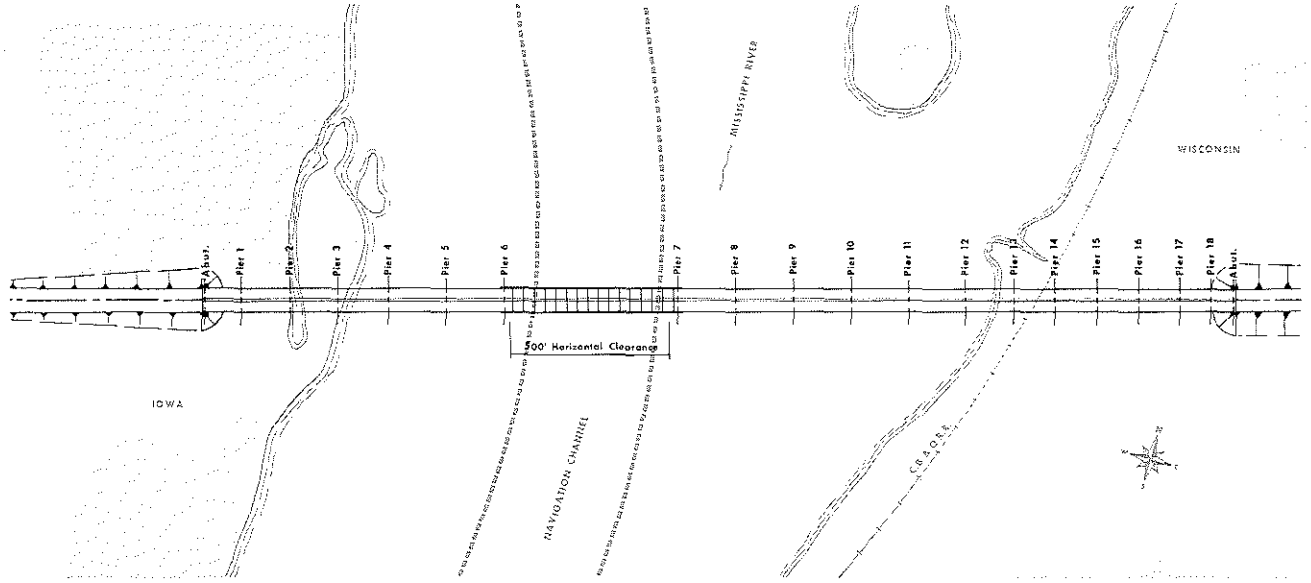
2. The City Island Alternate could become a part of the Dubuque Freeway system. Provision of a two lane facility directly serving the Dubuque CBD would be shortsighted planning.

3. Modern design practice for urban facilities – particularly in a metropolitan area of Dubuque's size – stress multi-lane facilities in congested travel corridors to accommodate peak hour volumes and for effective alternate routing of traffic in emergency situations.

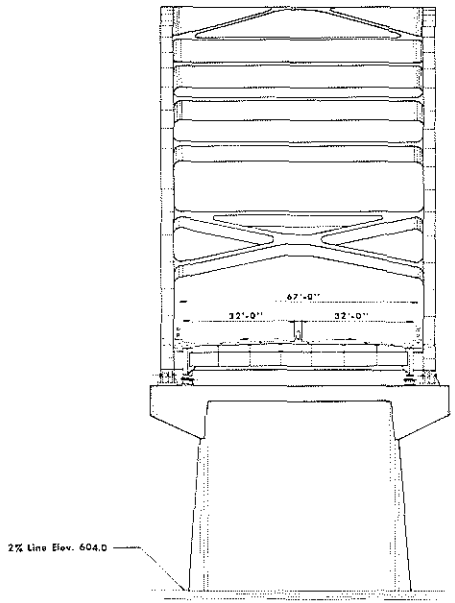
For these reasons, the cost of a four lane bridge has been estimated for the City Island Alternate.

A plan, elevation and typical section for the City Island Alternate is shown on Exhibit I-11. The twin 32 foot roadways provide 4 feet 6 inches of lateral clearance between the right hand edge of a typical 12 foot traffic lane and the barrier rail, and 3 feet 6 inches lateral clearance between the left edge of the inside lane and the 2 foot wide barrier median separating the two roadways. These clearances conform to the modern safety requirements of the American Association of State Highway Officials and the Bureau of Public Roads. There would be few pedestrians crossing the river, therefore, sidewalks will not be necessary and have not been provided.

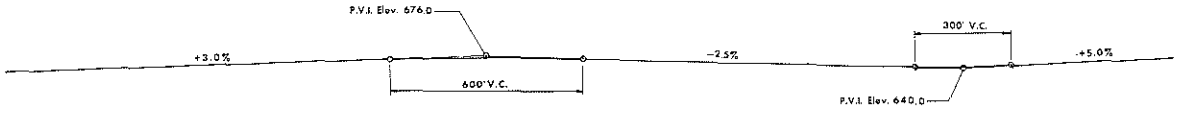
A navigation span of 500 feet measured face to face between piers on a line normal to the channel was used over the navigation channel. A Box Girder Tied Arch Span structure was estimated for this alternate. The cost of this aesthetically pleasing structure should compare favorably with other types of spans.



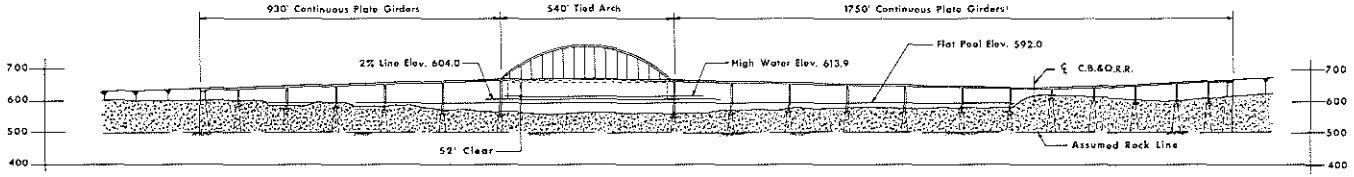
PLAN



SECTION THRU PLATE GIRDER SPAN
NEAR CHANNEL PIER



PROFILE GRADE



ELEVATION

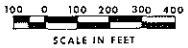


Exhibit I-11

CITY ISLAND ALTERNATE

GENERAL PLAN AND ELEVATION

TABLE I-2

ESTIMATE OF BRIDGE CONSTRUCTION COST

CITY ISLAND ALTERNATE

Dubuque, Iowa, Bridge

Continuous Girder Spans	930 ft.
Box Girder Tied Arch Span	540 ft.
Continuous Girder Spans	1,750 ft.
	3,220 ft.

Roadway Width - 32' - 0" Curb-to-Curb in each direction

ITEM	QUANTITY	UNIT PRICE	COST
Superstructure:			
Bridge Railing	6,480 L.F.	$ 12.00	$ 77,800
Concrete	6,180 C.Y.	90.00	556,200
Reinforcing Steel	1,855,000 Lbs.	0.14	259,700
Tied Arch Steel A-36	2,260,000 Lbs.	0.34	768,400
Tied Arch Steel A-441	2,540,000 Lbs.	0.38	966,200
Girder Steel A-36	2,353,000 Lbs.	0.29	682,400
Girder Steel A-441	4,102,000 Lbs.	0.32	$ 1,312,600
Cast Steel and Misc. Metal	235,000 Lbs.	0.70	164,500
Navigation Lighting		Lump Sum	40,000
	SUBTOTAL		$ 4,827,800
Substructure:			
Concrete	15,500 C.Y.	$ 65.00	$ 1,007,500
Reinforcing Steel	1,447,000 Lbs.	0.14	202,600
Steel Bearing Piles (12BP53)	45,120 L.F.	8.00	361,000
Steel Bearing Piles (14BP73)	10,600 L.F.	10.00	106,000
Steel Pile Cofferdams	80,790 S.F.	5.00	404,000
Excavation	15,910 C.Y.	10.00	159,100
	SUBTOTAL		$ 2,240,200
	TOTAL BRIDGE COST		$ 7,068,000

TABLE I-3

ESTIMATE OF BRIDGE CONSTRUCTION COST

HIGHWAY 20 BYPASS ALTERNATE

Dubuque, Iowa, Bridge

Continuous Girder Spans	805 ft.
Box Girder Tied Arch Span	450 ft.
Continuous Girder Span	1,465 ft.
	2,720 ft.

Roadway Width - 32' - 0" Curb-to-Curb

ITEM	QUANTITY	UNIT PRICE	COST
Superstructure:			
Bridge Railing	5,480 L.F.	$12.00	$ 65,800
Concrete	2,530 C.Y.	90.00	227,700
Reinforcing Steel	758,000 Lbs.	0.14	106,100
Tied Arch Steel A-36	918,000 Lbs.	0.34	312,100
Tied Arch Steel A-441	1,015,000 Lbs.	0.38	385,700
Girder Steel A-36	1,010,000 Lbs.	0.29	292,900
Girder Steel A-441	1,829,000 Lbs.	0.32	585,300
Cast Steel and Misc. Metal	102,000 Lbs.	0.70	71,400
Navigation Lighting	—	Lump Sum	20,000
	SUBTOTAL		$2,067,000
Substructure:			
Concrete	7,040 C.Y.	$65.00	$ 457,600
Reinforcing Steel	684,000 Lbs.	0.14	95,800
Steel Bearing Piles (12BP53)	21,920 L.F.	8.00	175,400
Steel Pile Cofferdams	40,100 S.F.	5.00	200,500
Excavation	7,070 C.Y.	10.00	70,700
	SUBTOTAL		$1,000,000
	TOTAL BRIDGE COST		$3,067,000

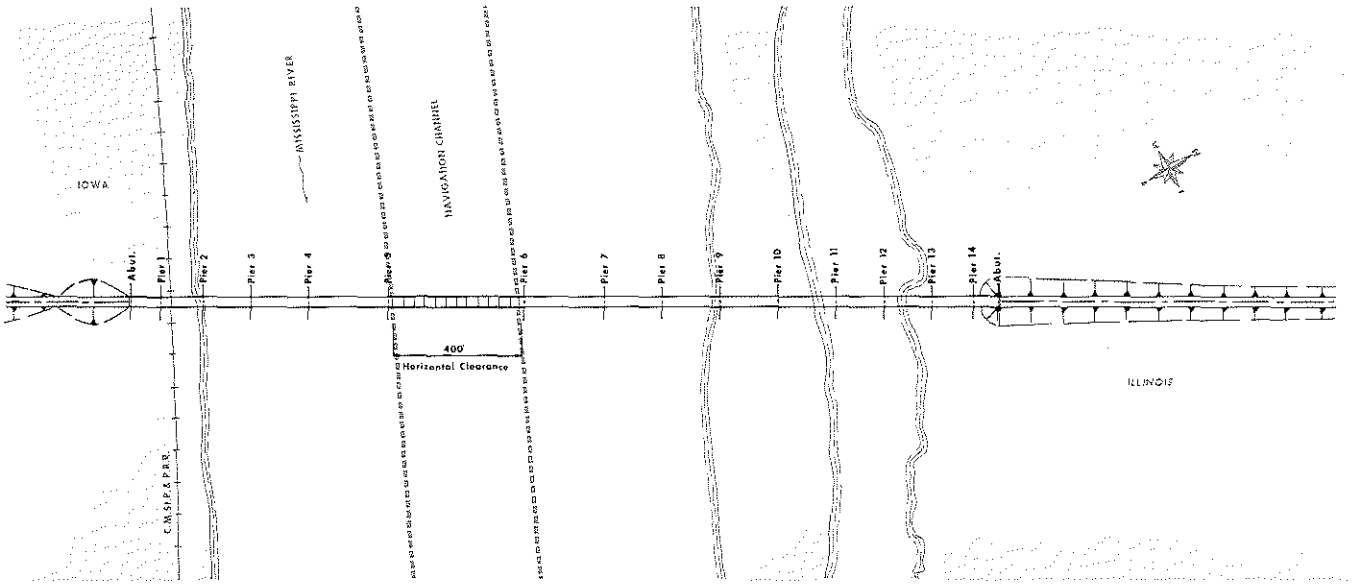
The estimated construction cost of the river bridge at the City Island Alternate location is $7,068,000. A detailed breakdown of this cost is shown in Table I-2. Quantities shown are based on a preliminary design of all structural components. Unit prices are based on a review of current construction prices of similar items with modest escalation to reflect the elapse of at least one year before bids could be received for construction contracts. Total estimated project cost for the City Island Alternate location is shown in Table I-5.

Highway 20 Bypass Alternate

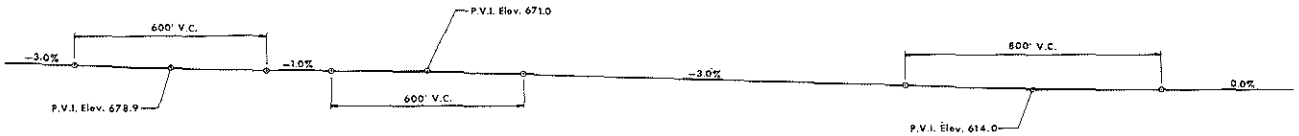
A plan, elevation and typical section for the Highway 20 Bypass Alternate is shown on Exhibit I-12. Similar structure type and design criteria, as that used for the Eagle Point Alternate A, was utilized at this location.

A navigation span of 425 feet permits a 400 foot navigation channel as will probably be required at this site.

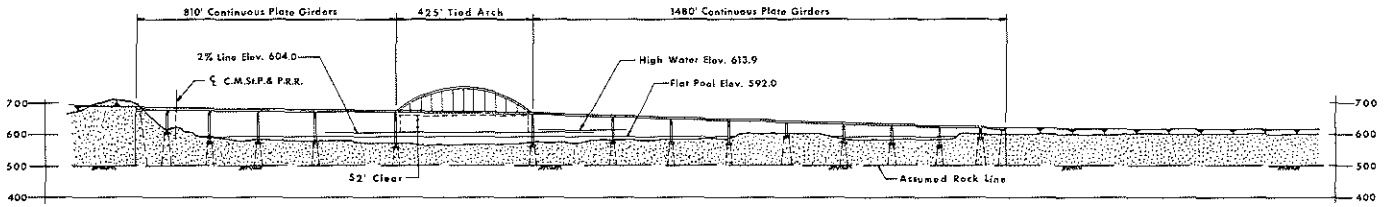
The estimated construction cost of the bridge at the Highway 20 Bypass location is $3,067,000. A detailed breakdown of this cost is shown in Table I-3. Quantities shown are based on a preliminary design of all structural components. Details of the total estimated project cost for the Highway 20 Bypass Alternate are shown in Table I-4.



PLAN

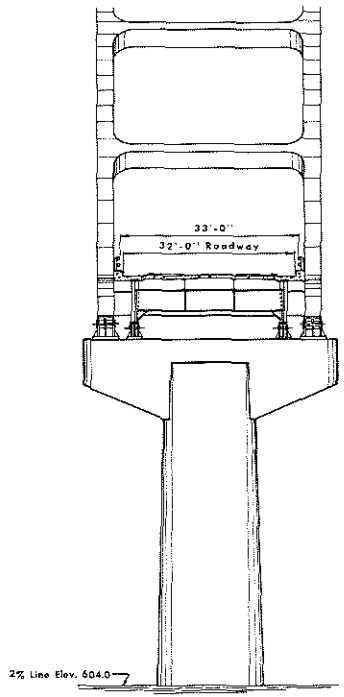


PROFILE GRADE



ELEVATION

100 0 100 200 300 400
SCALE IN FEET



SECTION THRU PLATE GIRDER SPAN
NEAR CHANNEL PIER

10 5 0 10 20
SCALE IN FEET

Exhibit I-12

HIGHWAY 20 BYPASS ALTERNATE

GENERAL PLAN AND ELEVATION

TABLE I-4

SUMMARY OF ESTIMATED PROJECT COSTS

Dubuque, Iowa, Bridges

	EAGLE POINT ALTERNATE A		HIGHWAY 20 BYPASS ALTERNATE	
	Iowa	Wisconsin	Iowa	Illinois
Roadway	$ 475,000	$332,000	$1,371,000	$ 749,000
Structures	2,417,000	—	3,067,000	189,000
Removal of Existing Bridge	200,000	—	—	—
Subtotal	$3,092,000	$332,000	$4,438,000	$ 938,000
Toll Booth Complex	85,000	—	85,000	—
Engineering and Contingencies	635,000	66,000	905,000	188,000
Total Construction	$3,812,000	$398,000	$5,428,000	$1,126,000
Right-of-Way Acquisitions and Contingencies	130,000	—	22,000	7,000
Administration and Legal	25,000	—	4,000	2,000
	15,000	—	3,000	1,000
TOTAL	$3,982,000*	$398,000	$5,457,000*	$1,136,000
TOTAL PROJECT COST	$4,380,000		$6,593,000	

*Iowa costs include all costs of the river structure up to and including the east abutment.

TABLE I-5

SUMMARY OF ESTIMATED PROJECT COSTS

Dubuque, Iowa, Bridges

	CITY ISLAND ALTERNATE		JULIEN DUBUQUE RESTORATION	
	Iowa	Wisconsin	Iowa	Illinois
Roadway	$ 699,000	$ 1,645,000	$ —	$ —
Structures	7,420,000	—	156,500	—
Removal of Existing Bridge	200,000	—	—	—
Subtotal	8,319,000	1,645,000	156,500	—
Toll Booth Complex	140,000	—	175,000	—
Engineering and Contingencies	1,761,000	494,000	68,500	—
Total Construction	10,220,000	2,139,000	400,000	—
Right-of-Way	41,000	25,000	—	—
Acquisitions and Contingencies	8,000	5,000	—	—
Administration and Legal	4,000	3,000	—	—
TOTAL	$10,273,000*	$ 2,172,000	$ 400,000*	$ —
TOTAL PROJECT COST		$12,445,000		$ 400,000

*Iowa costs include all costs of the river structure up to and including the east abutment.

Operation and Maintenance

The estimate of first year expenses for operation and maintenance for the Eagle Point Alternate A location is shown in Table I-6, for the City Island Alternate in Table I-7, and the Highway 20 Bypass Alternate in Table I-8, and also the Julien Dubuque Restoration in Table I-9. Inasmuch as operation of the bridges by the Iowa State Highway Commission will be somewhat different than that of a private operator, several cost assumptions have been made: (1) No per diem for commissioners or pro-rata cost for central administration by the Iowa State Highway Commission; and (2) employee fringe benefits will be similar to those provided by a private operation. Since the proposed bridge will be owned by a public agency, it has been assumed that it will not be subject to property or other local taxes.

TABLE I-6

ESTIMATE OF FIRST YEAR EXPENSES
FOR
OPERATION AND MAINTENANCE

Dubuque, Iowa, (Eagle Point) Bridge

ADMINISTRATION		
Toll Sergeant	$ 6,600	
Travel and Car Expense	1,000	
Consulting Engineers	3,600	
Miscellaneous	800	
Total Administration		$ 12,000
OPERATION		
Toll Collectors	$34,000	
Utilities	2,000	
Supplies and Postage	2,000	
Employee Benefits	3,000	
Total Operation		$ 41,000
REPAIRS AND MAINTENANCE*		$ 5,000
INSURANCE		$ 6,000
MAINTENANCE RESERVE		$ 6,000
Total Operation and Maintenance		$ 70,000

* By District maintenance forces on force account cost basis.

TABLE I-7

ESTIMATE OF FIRST YEAR EXPENSES
FOR
OPERATION AND MAINTENANCE

Dubuque, Iowa (City Island) Bridge

ADMINISTRATION		
Toll Sergeant	$ 7,280	
Travel and Car Expense	1,000	
Consulting Engineers	4,800	
Miscellaneous	920	
Total Administration		$ 14,000
OPERATION		
Toll Collectors	$45,000	
Utilities	2,500	
Supplies and Postage	2,500	
Employee Benefits	5,000	
Total Operation		$ 55,000
REPAIRS AND MAINTENANCE*		7,500
INSURANCE		11,500
MAINTENANCE RESERVE		12,000
Total Operation and Maintenance		$100,000

*By District maintenance forces on force account cost basis.

TABLE I-8

ESTIMATE OF FIRST YEAR EXPENSES
FOR
OPERATION AND MAINTENANCE

Dubuque, Iowa, (Hwy 20 Bypass) Bridge

ADMINISTRATION		
Toll Sergeant	$ 6,600	
Travel and Car Expense	1,000	
Consulting Engineers	3,600	
Miscellaneous	800	
Total Administration		$12,000
OPERATION		
Toll Collectors	$24,000	
Utilities	2,000	
Supplies and Postage	2,000	
Employee Benefits	3,000	
Total Operation		$31,000
REPAIRS AND MAINTENANCE*		5,000
INSURANCE		6,000
MAINTENANCE RESERVE		6,000
Total Operation and Maintenance		$60,000

*By District maintenance forces on force account cost basis.

TABLE I-9

ESTIMATE OF FIRST YEAR EXPENSES
FOR
OPERATION AND MAINTENANCE

Dubuque, Iowa (Julien Dubuque) Bridge

ADMINISTRATION		
Local Manager	$ 10,000	
Toll Sergeant	7,280	
Travel and Car Expense	1,000	
Consulting Engineers	4,800	
Miscellaneous	920	
Total Administration		$ 24,000
OPERATION		
Toll Collectors	$ 60,000	
Utilities	3,000	
Supplies and Postage	3,000	
Employee Benefits	8,000	
Total Operation		$ 74,000
REPAIRS AND MAINTENANCE*		$ 8,000
INSURANCE		$ 12,000
MAINTENANCE RESERVE		$ 12,000
Total Operation and Maintenance		$ 130,000

*By District maintenance forces on force account cost basis.

PART II

ESTIMATED PRELIMINARY TRAFFIC AND REVENUES AND PROJECT FEASIBILITY

INTRODUCTION

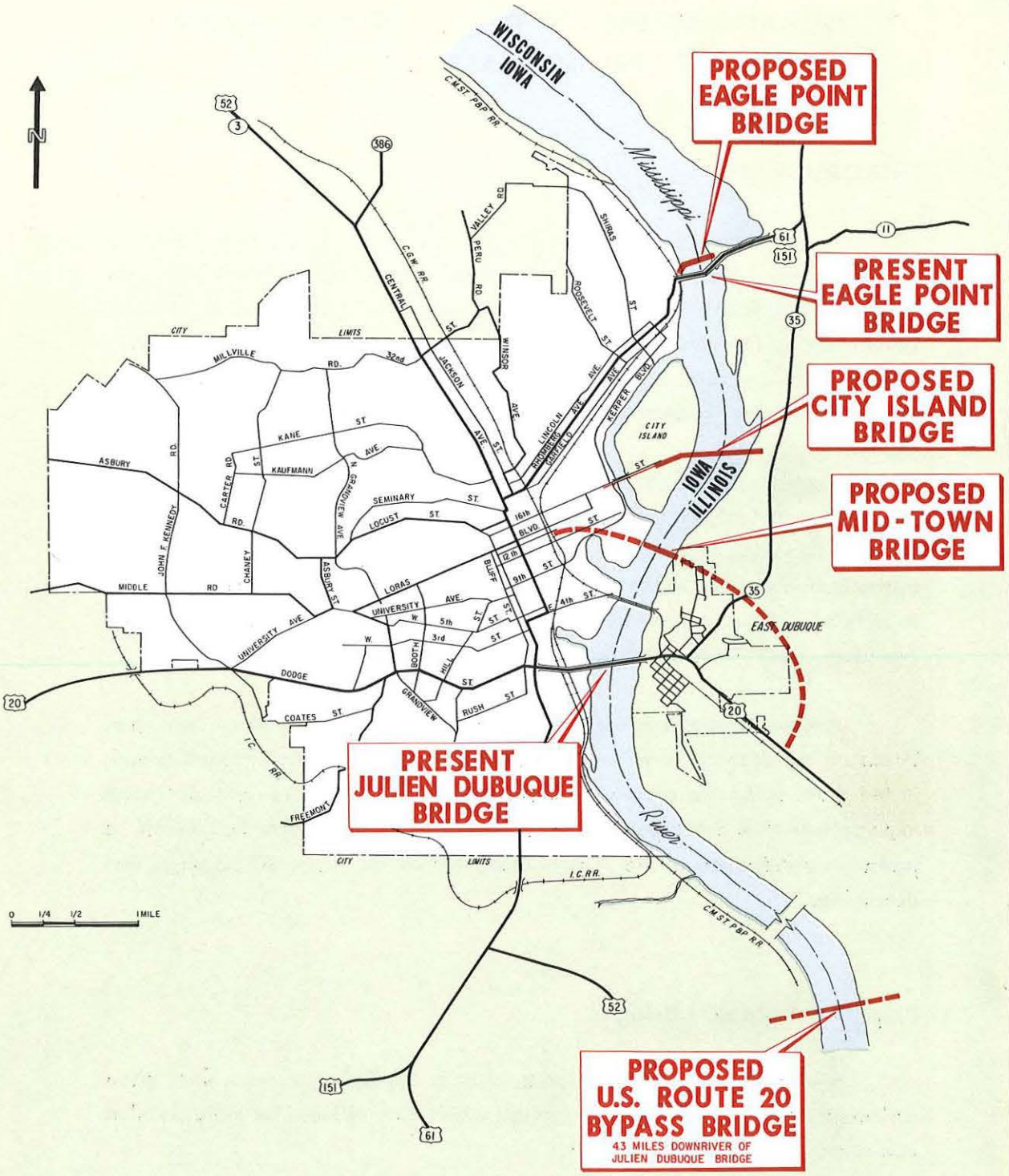
A general economic evaluation was made of the area now served by the two present bridges in Dubuque, as a guide in projecting future trans-river traffic growth. Route reconnaissance investigations were conducted to inventory present traffic facilities and to determine average operating speeds and other traffic service characteristics. All available trans-river travel patterns and traffic trend data for the Tri-State travel corridor were assembled.

Using the travel pattern information, travel speed and route inventory data and empirical diversion curves developed from studies of similar facilities, traffic assignments were made assuming modern toll crossings were available in the Dubuque area. Preliminary assignments were made at several toll rates to determine the rate structure which would optimize toll revenues while still providing a high level of traffic service.

Annual estimates of preliminary toll revenues were then developed based on the economic and traffic trend studies and estimates of future growth in the area. Using the project costs and annual maintenance and operating expense estimates developed by Howard, Needles, Tammen & Bergendoff, a preliminary indication of the relative feasibility of the proposed crossings was determined.

Proposed Dubuque Bridges

Several locations for new toll bridges in the Dubuque area were given preliminary study. The bridge alignments which were selected for more detailed studies are depicted in Exhibit II-1.



LOCATION MAP

Wilbur Smith and Associates

EXHIBIT II-1

The proposed Eagle Point Bridge would replace the present crossing with a modern, two-lane structure on an alignment immediately north of the existing bridge. The proposed City Island crossing would connect 16th Street in Dubuque with Wisconsin Route 11. Assignments were also made to the Mid-Town Bridge location depicted in Exhibit II-1, a crossing connecting 13th Street in Dubuque with a landing at the north edge of East Dubuque and an approach road following an alignment around East Dubuque to an interchange with U. S. Route 20, east of East Dubuque. Interchanges would be provided at Kerper Boulevard in Dubuque and at Illinois Route 35.

The third new crossing considered was a proposed U. S. Route 20 Bypass Bridge, located approximately 4.3 miles south of the present Julien Dubuque Bridge. An interchange with existing U. S. Route 20 would be provided approximately 3.9 miles east of the intersection of U. S. Route 20 and Illinois Route 35.

Each of the proposed facilities would be constructed to high-design standards to provide a high level of traffic service for all vehicle types. Each crossing would provide for two travel lanes with a 32-foot roadway section and would operate as a toll project. Consideration was also given to possible construction of a four-lane bridge on the City Island location.

The following seven alternate bridge construction programs were analyzed to determine relative levels of financial feasibility:

BRIDGE PROGRAM	CROSSINGS
I	Proposed Eagle Point
	Present Julien Dubuque (Free)
	Proposed U. S. Route 20 Bypass
II	Proposed Eagle Point
	Present Julien Dubuque (Toll)
	Proposed U. S. Route 20 Bypass

BRIDGE PROGRAM	CROSSINGS	
III	Proposed	Eagle Point
	Proposed	Mid-Town
	Present	Julien Dubuque (Toll)
	Proposed	U. S. Route 20 Bypass
IV	Proposed	City Island (Two-Lane)
	Present	Julien Dubuque (Free)
	Proposed	U. S. Route 20 Bypass
V	Proposed	City Island (Two-Lane)
	Present	Julien Dubuque (Toll)
	Proposed	U. S. Route 20 Bypass
VI	Proposed	City Island (Four-Lane)
	Present	Julien Dubuque (Free)
	Proposed	U. S. Route 20 Bypass
VII	Proposed	City Island (Four-Lane)
	Present	Julien Dubuque (Toll)
	Proposed	U. S. Route 20 Bypass

AREA GROWTH ANALYSES

Several economic parameters were evaluated to determine levels and recent growth trends in the area which would be directly served by the proposed bridges. These indices included population, retail sales and average effective buying income per family. In addition, trends in motor vehicle registrations and motor fuel consumption, both excellent indicators of travel growth, were analyzed.

Local field reconnaissance was conducted in Dubuque and the surrounding area which would be most directly served by the proposed new bridges. Contact was made with various officials to obtain information regarding trends and characteristics of residential, commercial and industrial land use. Available trend data and growth forecasts for the bridge study area were assembled and reviewed.

Study Area Characteristics

Dubuque, the oldest city in Iowa, has traditionally served as the principal trade center for a ten-county Tri-State area. The region comprises counties from northeastern Iowa, southwestern Wisconsin and northwestern Illinois.

As a transportation hub, the city is served by five U. S. designated highways and three important state routes. Travel and transportation is further enhanced by the presence of four railroads, one regional airline, eleven truck lines and river barge facilities.

In 1960, Dubuque provided employment for over 30,000 persons, approximately one third of them engaged in manufacturing. In addition to employment opportunities, Dubuque is the site of three colleges or universities and four seminaries.

Population Trends

In 1960, the population of Dubuque was 56,606. This represented an average annual increase of 1.3 per cent per year between 1950 and 1960. As shown in Table II-1, the city population in 1966 was 62,853, an average annual growth of 1.9 per cent since 1960. East Dubuque, Illinois, recorded an average annual population growth of 2.1 per cent between 1950 and 1960 to a population of 2,082 in the latter year. Other communities in the Dubuque area also realized population gains with the exception of Galena, which recorded a slight decline. Dickeyville, Wisconsin, experienced the best growth increasing an average of 9.6 per cent per year between 1950 and 1960.

A three-county study area, comprised of those counties which would be most advantageously served by new crossings in Dubuque was defined for study purposes and included Dubuque County in Iowa, Grant County in Wisconsin and Jo Daviess County in Illinois. The three-county population in 1960 was 146,288. By 1966, this increased to an estimated 159,400, an average annual growth of 1.4 per cent. This growth exceeded that realized statewide in Iowa, Illinois and Wisconsin, but was slightly below the national growth rate.

Trends in Retail Sales

Good growths in retail sales have occurred in the three-county study area over the past decade. In 1956, the study area recorded total retail sales of $153,394,000. By 1961, this had increased to $189,546,000, representing an average annual increase of 4.3 per cent. Over the next five years, the growth rate decreased slightly to an average of 3.7 per cent per year. Total retail sales in the three-county study area in 1966 amounted to $227,696,000.

The average annual growths recorded in the three-county study area between 1956 and 1961 were substantially higher than those realized statewide in Illinois, Iowa, Wisconsin and also for the nation. During the next five years, however, the growth rate was somewhat lower than the state and national trend.

TABLE II-1

POPULATION TRENDS

AREA	1950	AVERAGE ANNUAL PER CENT CHANGE	1960	AVERAGE ANNUAL PER CENT CHANGE	1966
Municipalities:					
Dickeyville	269	9.6	671		N.A.
Dubuque	49,671	1.3	56,606	1.9	62,853
East Dubuque	1,697	2.1	2,082		N.A.
Galena	4,648	— 0.5	4,410		N.A.
Platteville	5,751	1.9	6,957		N.A.
Counties:					
Dubuque	71,337	1.2	80,048	2.4	92,500
Grant	41,460	0.7	44,419	0.4	45,600
Jo Daviess	21,459	0.2	21,821	— 0.4	21,300
Three-County Total	134,256	0.9	146,288	1.4	159,400
States:					
Illinois	8,712,176	1.5	10,081,158	1.2	10,775,300
Iowa	2,621,073	0.5	2,757,537	0.3	2,813,600
Wisconsin	3,434,575	1.4	3,951,777	1.2	4,247,100
United States[1]	150,697,361	1.7	178,464,236	1.6	196,208,200

[1] Does not include Alaska and Hawaii.

N.A. = Not Available.

SOURCE: U. S. Department of Commerce, Bureau of Census; *Sales Management*, "Survey of Buying Power."

Average Effective Buying Income Per Family Trends

In 1956, the average effective buying income per family in the three-county study area was $5,392. By 1966, this had increased to $8,480, an average annual growth of 2.4 per cent between 1956 and 1961 and 6.9 per cent between 1961 and 1966. The excellent growth recorded over the past five years was slightly below the statewide increase realized in Iowa but above the Illinois, Wisconsin and national growth trend.

The 1966 average effective buying income per family in the three-county study area of $8,480 compared with the statewide averages of $9,998 in Illinois, $8,416 in Iowa, $8,418 in Wisconsin and the national average income of $8,522.

Trends in Motor Vehicle Registrations

Motor vehicle registrations in the three-county study area in 1956 amounted to 54,671. By 1966, this had increased to 72,430, representing average annual growths of 2.2 per cent between 1956 and 1961 and 3.5 per cent between 1961 and 1966. The growth recorded in the three-county study area during the past five years was comparable to that experienced in Illinois and Iowa, exceeded the Wisconsin average and was slightly below the national growth.

Motor Fuel Consumption Trends

Reflecting the growths in personal income and motor vehicle registrations in the last decade, personal travel, as measured by motor fuel consumption, has also increased substantially. Motor fuel consumption in Iowa increased an average of 2.0 per cent per year between 1956 and 1961, increasing to 2.5 per cent per year between 1961 and 1966. Illinois recorded annual increases of 2.4 per cent between 1956 and 1961 and 3.6 per cent between 1961 and

1966. The Wisconsin annual growth in motor fuel consumption was 2.8 and 3.5 per cent for the five year periods of 1956-1961 and 1961-1966, respectively. The national growth rates exceeded those of all three states during the past decade.

Future Growth

From 1960 to 1966, the three-county study area experienced a population growth of 1.4 per cent per year. As shown in Table II-2, it is anticipated that a comparable increase will occur through 1980 and 1990. Dubuque County

TABLE II-2

POPULATION PROJECTIONS

AREA	ACTUAL 1960	AVERAGE ANNUAL PER CENT CHANGE	ESTIMATED 1980	ESTIMATED 1990
Municipalities:				
Dubuque	56,606	1.5	75,913	
Counties:				
Dubuque	80,048	1.6	110,580	
Grant	44,419	0.8		56,209
Jo Daviess	21,821	0.8	25,500[1]	
States:				
Illinois	10,081,158	1.4	13,337,150[1]	
Iowa	2,757,537	0.8		
Wisconsin	3,951,777	1.4		5,916,775

[1] Average of Series I and II 1980 Projections prepared by the Illinois Department of Business and Economic Development.

SOURCE: Iowa State Highway Commission; Wisconsin Department of Resource Development, Illinois Department of Business and Economic Development.

is estimated to experience an average annual growth of 1.6 per cent per year between 1960 and 1980. This surpasses the annual growths anticipated for Grant and Jo Daviess Counties and for the states of Illinois, Iowa and Wisconsin. The City of Dubuque is estimated to have a population of 75,913 in 1980, representing an average annual increase of 1.5 per cent over the 1960 population.

Total employment in Dubuque County in 1960 was 30,700. As shown in Table II-3, this is estimated to increase to 35,700 in 1980. A significant decrease in agricultural employment is anticipated with other types of employment more than offsetting this decrease. While resident employees will continue to dominate the employment projections for the next 20 years, a significant increase in commuting employees is estimated between 1960 and 1970, 11.1 per cent per year. The influence of suburban living is estimated to taper off to an annual growth in commuting employees of 0.7 per cent between 1970 and 1980.

In 1967, a survey of 120 industrial plants in the Dubuque area determined that 11,430 employees were employed. Two firms, the John Deere Dubuque Tractor Works and the Dubuque Packing Company employed 3,000 or more persons, 13 companies employed between 100 and 700 and 15 industries employed between 50 and 100 employees. Table II-4 shows that 2,978 employees or 26 per cent of the total industrial employment force were commuters. Nationally, 30 miles is considered a reasonable maximum distance for commuting. Of the 2,978 industrial employees, 1,395 were residents of Wisconsin, 1,004 from Iowa communities and 579 from Illinois, primarily East Dubuque and Galena.

All of those out-of-state commuters are, of course, potential to the Dubuque bridges. As employment grows, bridge traffic will also increase. Increased prosperity and leisure time will also act to create more travel in the Dubuque area on present and proposed river crossings.

TABLE II-3

ECONOMIC PROJECTIONS

ITEM	1960	AVERAGE ANNUAL PER CENT CHANGE	1970	AVERAGE ANNUAL PER CENT CHANGE	1980
Employment:					
Dubuque County[1]					
Agriculture	2,650	— 8.5	2,050	— 9.3	1,550
Mining	50	1.8	60	1.6	70
Construction	860	0.9	940	1.0	1,040
Transp./Comm./Utilities	1,620	0.1	1,630	0.1	1,640
Wholesale/Retail Trade	4,550	0.9	4,990	1.2	5,640
Finance/Ins./Real Estate	660	1.3	750	0.9	820
Government	1,470	1.9	1,770	1.9	2,140
Services & Miscellaneous	7,610	0.9	8,360	1.1	9,300
Total Non-Manufacturing	19,470	0.5	20,550	0.8	22,200
Total Manufacturing	10,600	1.1	11,850	1.3	13,500
Total Employment	30,700	0.5	32,400	1.0	35,700
Employees:					
Dubuque County[1]					
Resident	28,720	— 0.1	28,400	1.0	31,400
Commuting	1,350	11.1	4,000	0.7	4,300
Total	30,700	0.5	32,400	1.0	35,700

[1] Includes employees from counties in Iowa, Illinois and Wisconsin.

SOURCE: The Dubuque Development Program, Victor Gruen Associates and Larry Smith and Company, 1965.

TABLE II-4

COMMUTING INDUSTRIAL EMPLOYEES[1]

Dubuque, Iowa — 1967

AREA	COMMUNITY TOTAL	STATE TOTAL	PER CENT
Illinois: East Dubuque	386		
Galena	173		
Other Communities	20		
Subtotal		579	19.4
Iowa: Bellevue	120		
Guttenberg	108		
Sherill	97		
Dyersville	91		
Epworth	86		
Farley	69		
Peosta	59		
Durange	56		
Cascade	51		
Holy Cross	51		
Other Communities	216		
Subtotal		1,004	33.7
Wisconsin: Platteville	238		
Cuba City	235		
Hazel Green	210		
Potosi	164		
Lancaster	136		
Dickeyville	107		
Benton	67		
Cassville	53		
Other Communities	185		
Subtotal		1,395	46.9
TOTAL		2,978	100.0
Industrial Employees:			
Resident		8,452	74.0
Commuting		2,978	26.0
TOTAL		11,430	100.0

[1] Industrial Firms only. SOURCE: The Dubuque Industrial Bureau.

TRAFFIC STUDIES

Preliminary studies were made to evaluate the traffic potential of additional toll crossings in the Dubuque area. These studies included analyses of the magnitude and composition of traffic and travel patterns as well as the quality of traffic service provided by the existing bridges and closest crossings to the north and south.

Route Reconnaissance

In Illinois, U. S. Route 20, west of Galena, is a four-lane highway. Through Dubuque, U. S. Route 20 follows Dodge Street, which is a four-lane arterial street to Grandview Avenue and then a four-lane divided highway west of Grandview Avenue. West of Dubuque, the route is a two-lane facility. Dodge Street, from the Mississippi River floodplain, rises to the elevation of the bluffs, creating a long uphill grade for westbound heavy commercial vehicles. West of Dubuque to Iowa Route 136, U. S. Route 20 has a sufficiency rating ranging from "tolerable" to "excellent". Within Dubuque, the route carries ratings from "critical" to "excellent".

Iowa Route 3, from Dubuque to U. S. Route 52 is for the most part a two-lane highway with a short four-lane section just north of Dubuque. It is in generally good condition.

U. S. Route 61-151 traffic enters the city on Rhomberg Avenue and East 20th Street, both of which are two-lane roads traversing part residential and part commercial neighborhoods. Rhomberg Avenue, at an elevation of 611 ± Mean Sea Level, is inundated during periods of extreme high water. U. S. Route 61, through Dubuque has sufficiency ratings ranging from "critical" to "tolerable". South of U. S. Route 20, U. S. Route 61 is a four-lane arterial street through Dubuque and an excellent two-lane highway to Iowa Route 64.

Posted speed limits in the bridge study area range downward from the daytime limit of 70 MPH for automobiles on principal Iowa routes to 15 MPH

in the downtown area of Dubuque. Speed and delay surveys revealed generally good travel conditions with no difficulty in maintaining speeds close to the posted limits on streets and highways beyond the downtown area.

Present Traffic Volumes

The importance, in terms of traffic volumes, of the several highways approaching the Dubuque urban area is depicted in Exhibit II-2. The impact of Dubuque and smaller urban centers on traffic volumes is clearly shown.

In Iowa, U. S. Route 20 is the principal east-west traffic artery. U. S. Route 151, south of the U. S. Route 20 corridor also performs an important traffic function carrying substantially more east-west traffic than U. S. Route 52, to the north of U. S. Route 20.

U. S. Routes 61 and 52 south of Dubuque accommodate about the same traffic levels with U. S. Route 61 in Wisconsin, an important north-south traffic facility north of the city. In Iowa, U. S. Route 52 is the major north-south highway between Prairie du Chien and Dubuque.

Annual Traffic and Revenue Trends — Eagle Point Bridge

In 1958, 1,690 vehicles per day used the Eagle Point Bridge resulting in annual revenues of $135,710. During the next nine years, as shown in Table II-5, traffic increased an average of 5.2 per cent annually to 2,670 vehicles daily in 1967. Correspondingly, during the same period, revenues increased 5.3 per cent per year to $215,240 in 1967. During the last five years, traffic and revenues increased 5.9 and 6.0 per cent per year, respectively.

Annual Traffic Trends — Alternate Crossings

Annual traffic trends on the Julien Dubuque Bridge and the closest competitive crossings to the north and south of Dubuque are shown in Table II-6.

TRAFFIC FLOW MAP

1965 AVERAGE DAILY TRAFFIC

Wilbur Smith and Associates

EXHIBIT II-2

TABLE II-5

ANNUAL TRAFFIC AND REVENUE TRENDS

Eagle Point Bridge

YEAR	AVERAGE DAILY TRAFFIC	ANNUAL GROSS REVENUES
1958	1,690	$135,710
1959	1,780	143,323
1960	1,860	149,404
1961	2,020	162,081
1962	2,000	160,796
1963	2,080	166,965
1964	2,210	178,057
1965	2,250	181,548
1966	2,580	207,119
1967	2,670	215,240
AVERAGE ANNUAL PER CENT CHANGE:		
1958-1967	5.2	5.3
1962-1967	5.9	6.0

SOURCE: The Dubuque and Wisconsin Bridge Company.

Julien Dubuque Bridge — In 1957, this facility carried 8,600 vehicles on an average day, increasing to 13,200 vehicles a day in 1967. This represented an average increase of 4.4 per cent per year. During the past five years, traffic growth on the Julien Dubuque Bridge has averaged 3.9 per cent annually. As shown in Table II-6, several times as many motorists use the Julien Dubuque Bridge compared to the Eagle Point crossing.

TABLE II-6

ANNUAL TRAFFIC TRENDS

Trans-River Crossings

YEAR	PRAIRIE DU CHIEN BRIDGE	EAGLE POINT BRIDGE	JULIEN DUBUQUE BRIDGE	SAVANNA-SABULA BRIDGE
		(Average Daily Traffic)		
1957	2,370	N.A.	8,600	N.A.
1958	2,400	1,690	8,600	N.A.
1959	2,590	1,780	8,600	862
1960	3,210	1,860	9,370	937
1961	3,250	2,020	10,130	908
1962	2,740	2,000	10,900	918
1963	3,130	2,080	11,270	902
1964	2,980	2,210	11,630	918
1965	2,840	2,250	12,000	928
1966	3,270	2,580	12,700	897
1967	3,390	2,670	13,200[1]	682[2]
AVERAGE ANNUAL PER CENT GROWTHS:				
1957-1967	3.6	5.2[3]	4.4	0.6[4]
1962-1967	4.3	5.9	3.9	— 0.5[5]

N.A. = Not Available.

(1) Estimated AADT.

(2) Bridge closed 5/5/67 to 7/18/67 — Approach route repairs.

(3) Nine-Year Average 1958-1967.

(4) Seven-Year Average 1959-1966.

(5) Four-Year Average 1962-1966.

SOURCE: Wisconsin Department of Transportation. Illinois State Highway Department. The Savanna-Sabula Bridge Company. The Dubuque and Wisconsin Bridge Company.

Prairie du Chien Bridge — The present U. S. Route 18 bridge at Prairie du Chien is a two-lane facility with weight restrictions in effect. Use of the Prairie du Chien Bridge has increased from an average of 2,370 daily vehicles in 1957 to 3,390 in 1967, an average annual growth of 3.6 per cent. During the last five years, 1962 to 1967, an average annual increase of 4.3 per cent occurred.

Savanna-Sabula Bridge — The Savanna-Sabula Bridge is a two-lane toll facility designated as U. S. Route 52 and Iowa-Illinois Route 64 between Savanna, Illinois and Sabula, Iowa. Between 1959 and 1966, the bridge experienced only minimal traffic growth, from 862 vehicles on an average day in 1959 to 897 in 1966. This represented an average annual growth of 0.6 per cent per year over the seven-year period.

Monthly Traffic Variations

Monthly traffic variations on U. S. Route 61-151 in Grant County, Wisconsin and on the Eagle Point Bridge indicate that August represents the peak travel month. January is the low traffic month with February also considerably below average.

Origin and Destination Studies

In the Fall of 1965, the Iowa State Highway Commission conducted a comprehensive origin-destination traffic survey of the Dubuque metropolitan area. The Illinois Department of Public Works and Buildings, Division of Highways, and the State Highway Commission of Wisconsin also participated in the survey by gathering data for portions of the study area in their respective states. The trans-river travel patterns developed from the interview surveys were used as the basis for determining a redistribution of trans-river trips, assuming new toll facilities were constructed. In addition to the Dubuque origin-destination traffic report, use was also made of an origin-destination survey conducted on the Savanna-Sabula Bridge in April, 1968.

Vehicle Classification Counts — Eagle Point Bridge

Vehicle classification counts on the Eagle Point Bridge, as reported by the Dubuque-Wisconsin Bridge Company, are shown in Table II-7. In 1967, 2,670 vehicles passed over the bridge on an average day, of which, passenger cars accounted for 2,606. Weight restrictions on the bridge limited commercial traffic to light trucks only with 57 one-to-two-ton and seven, over two-ton vehicles per day recorded.

TABLE II-7
VEHICLE CLASSIFICATION COUNT
Eagle Point Bridge — 1967

VEHICLE CLASS	AVERAGE DAILY TRAFFIC
Passenger Car	
Driver only	1,018
Two or more occupants	1,564
Hauling one-axle trailer	18
Hauling two-axle trailer	1
Hauling cabin trailer	4
Hauling house trailer	1
Bus[1]	
Two-Axle Truck	
1-2 ton	57
Over 2 ton	7
Semis (Prohibited)	
TOTAL	2,670

[1] Negligible. SOURCE: The Dubuque and Wisconsin Bridge Company.

Vehicle Classification Counts — Julien Dubuque Bridge

Of the 12,000 vehicles that used the Julien Dubuque Bridge on an average day in 1965, 10,250 were passenger cars, 518 were pick-up and panel trucks and 595 were single unit trucks. All semi-trailers and truck-trailers traveling the Dubuque Tri-State corridor must use the Julien Dubuque Bridge. As shown in Table II-8, 388 semi-trailers with five or more axles used the facility on an average day, followed in relative importance by 150, four-axle and 71, three-axle semi-trailer combinations.

TABLE II-8

VEHICLE CLASSIFICATION SUMMARY[1]
Julien Dubuque Bridge
1965

VEHICLE CLASS	AVERAGE DAILY TRAFFIC
Passenger Cars	10,250
Pick-Ups and Panels	518
Single Unit Trucks	
Two-axle, four-tire	74
Two-axle, six-tire	436
Three-axle	85
Semi-Trailer Combinations	
Three-axle	71
Four-axle	150
Five or more axles	388
Truck-Trailer	16
Buses	12
TOTAL	12,000

[1] Adjusted to reflect average daily traffic levels in 1965.

SOURCE: Iowa State Highway Commission, Traffic and Highway Planning Department.

Travel Desires

The origin and destination data collected during the 1965 traffic study were coded to the geographic traffic zone patterns partially shown in Exhibit II-3. The illustration also depicts the travel desires which would be wholly or partially potential to the present and proposed bridges in the Dubuque area. The width of the flow bands shown in the illustration are proportional to the number of trips moving between each zone pair on an average day in 1965.

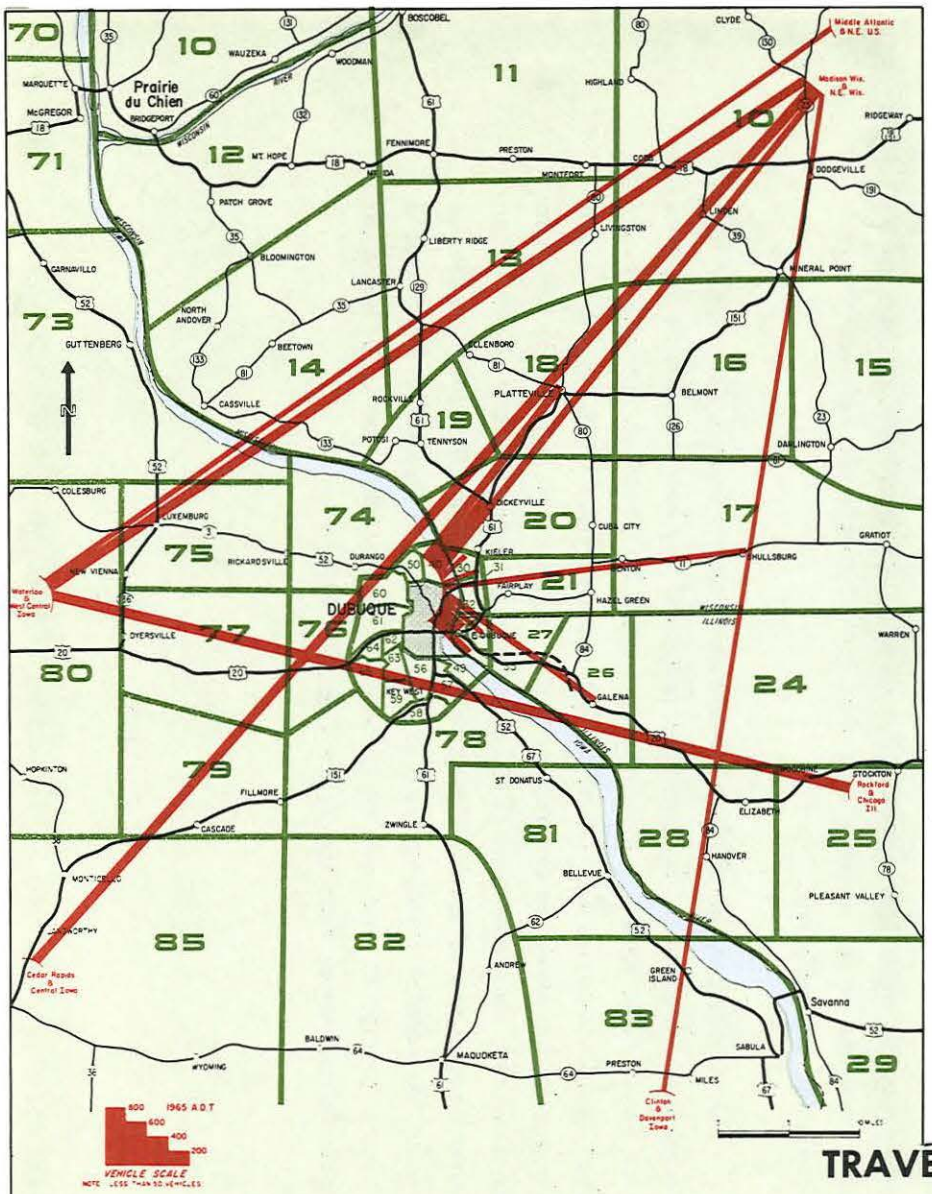
The importance of Dubuque as a traffic generator, and more particularly the central business district, is clearly shown in the illustration. For instance, the CBD, (Zone 45), attracted or generated 187 daily trips to the Madison — northeast Wisconsin area, 73 to Lancaster, 100 to Platteville, 309 to Dickeyville, 150 to Hazel Green, and 273 to Galena. The heaviest trans-river movement was between the CBD and Zone 33 in East Dubuque — 813 trips per day.

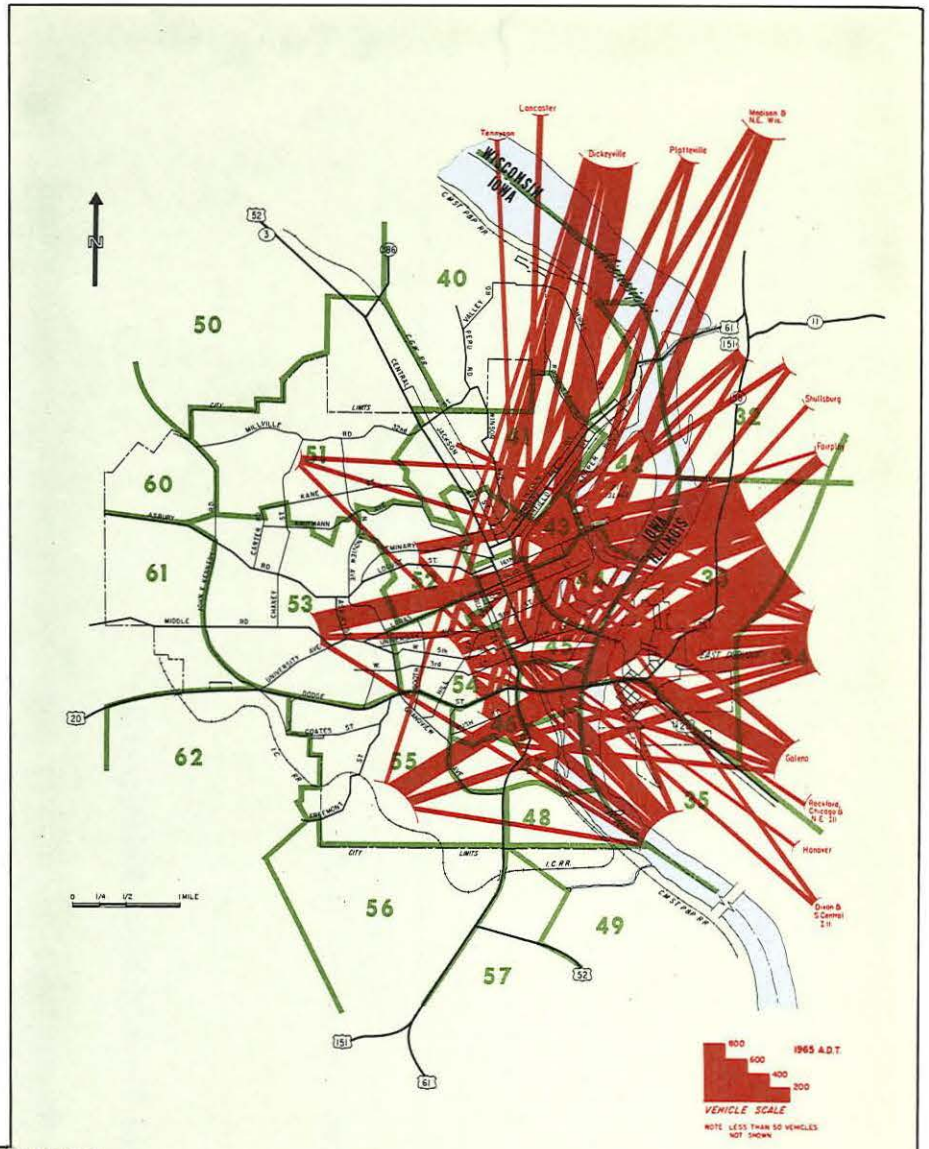
Through traffic movements, crossing the Mississippi at Dubuque, had the U. S. Route 20 corridor, including Waterloo and Sioux City, as a major trip termini to the west. Important eastern trip termini were the northeast United States area (69 trips), the Madison — northeast Wisconsin area (42 trips) and the Rockford-Chicago area (142 trips).

Typical Time-Distance Relationships

Representative time-distance relationships for several movements which would have a choice of alternate bridge routings within the Dubuque area are shown in Table II-9. The travel times and distances indicated were developed from the route reconnaissance studies conducted on all pertinent highways serving the alternate river bridges. The driving times represent average speeds rather than the fastest driving time that could be achieved between the various trip termini indicated.

On a trip between Dickeyville and downtown Dubuque, a savings of four minutes would be realized by using the proposed City Island Bridge as opposed to an Eagle Point crossing; the distance would be identical. Between Hazel Green and Dubuque, a City Island Bridge routing versus a trip via the Julien Dubuque Bridge would be one mile and five minutes shorter. A trip between East Dubuque and downtown Dubuque would be shorter by one mile and one minute through use of the Mid-Town Bridge rather than the Julien Dubuque crossing. A motorist traveling from Galena, Illinois to Dyersville, Iowa would realize a savings of one mile and seven minutes by using the U. S. Route 20 Bypass Bridge rather than the Julien Dubuque Bridge.





TRAVEL DESIRES

PRESENT EAGLE POINT BRIDGE — JULIEN DEBUQUE BRIDGE

1965 AVERAGE DAILY TRAFFIC

Wilbur Smith and Associates

EXHIBIT II-3

TABLE II-9

TYPICAL TIME-DISTANCE RELATIONSHIPS

BETWEEN	VIA	DISTANCE (miles)	TIME (min.)	AVERAGE SPEED MPH	SAVINGS VIA PROPOSED BRIDGE (miles)	SAVINGS VIA PROPOSED BRIDGE (min.)
Dickeyville and Dubuque (CBD)	Eagle Point Bridge	10	19	32	— —	4
	Proposed City Island Bridge	10	15	40		
Hazel Green and Dubuque (CBD)	Proposed City Island Bridge	13	20	39	1	5
	Julien Dubuque Bridge	14	25	34		
East Dubuque and Dubuque (CBD)	Proposed Mid-Town Bridge	3	7	26	1	1
	Julien Dubuque Bridge	2	6	20		
Galena and Dyersville	Julien Dubuque Bridge	36	47	46	1	7
	Proposed U. S. Route 20 Bypass Bridge	35	40	52		

ESTIMATED TRAFFIC AND REVENUES

Estimated traffic and revenues for the proposed Dubuque bridges are based upon the number of motorists who will be diverted from present bridge crossings. In addition, the new facilities are expected to generate additional usage of an induced nature.

Basic Assumptions

Estimates of traffic and revenues for the proposed Dubuque bridges are predicated on the following assumptions:

1. The facilities will be open to traffic on July 1, 1971.

2. The bridges will be constructed on the alignments and with the approaches discussed in this report.

3. No new river crossings will be constructed in the reach of the Mississippi River between Prairie du Chien and Sabula.

4. The present Eagle Point Bridge will be demolished.

5. The toll schedule recommended in this report will be implemented.

6. The bridges will be adequately maintained, efficiently operated and effectively signed to encourage maximum usage.

7. The present general trend in economic activity in the bridge study area will continue and no national emergency will arise which will abnormally restrict the use of motor vehicles.

Any departure from the above assumptions could materially affect estimated traffic and revenues for the proposed bridges.

Recommended Method of Toll Collection

It is recommended that tolls be collected from all motorists using the proposed bridges at toll plazas located on the western approaches to the facilities. A single toll booth designed and constructed to provide for two toll attendants, one collecting from each direction of travel, would initially be adequate for the proposed Eagle Point, City Island (two-lane) and Mid-Town Bridges. Initial construction should, however, recognize the possible future need for one additional toll lane in each direction.

Toll collection on the proposed U. S. Route 20 Bypass Bridge would require only one attendant collecting tolls from both directions of travel; provision should be made in the initial design and construction of the booth to ultimately provide for two toll attendants, one collecting from each direction of travel.

If tolls were imposed on the present Julien Dubuque Bridge, a multi-lane plaza would be required. This would also be desirable if the City Island Bridge were constructed as a four-lane facility. The exact number of toll lanes and lane "mix" between attended and automatic lanes could only be determined through more detailed studies.

Recommended Toll Schedule

Several toll rates were analyzed to determine the best toll structure for the proposed Dubuque bridges. These studies indicated that the preliminary toll schedule, shown in Table II-10, would produce optimum revenues for the proposed facilities while maintaining a high level of traffic service. The toll schedule would apply to all of the proposed facilities. Assuming the Julien Dubuque Bridge remains toll free, a higher toll would discourage usage of the proposed bridges to the point where total revenues would be less than those estimated under the recommended schedule. Conversely, a lower toll would increase usage but not sufficiently to produce higher revenues than those projected.

TABLE II-10

RECOMMENDED TOLL SCHEDULE

VEHICLE TOLL CLASS	DESCRIPTION	TOLL
1	Two-axle vehicles	$0.20
2	Three-axle vehicles and vehicle combinations	0.30
3	Four-axle vehicles and vehicle combinations	0.40
4	Five-axle vehicles and vehicle combinations	0.50
	Each additional axle	0.10

If tolls were imposed on the present Julien Dubuque Bridge as part of a new bridge construction program, higher trans-river tolls could be charged on the present bridge and proposed crossings. The substantial distance to the nearest existing bridges to the north and south of Dubuque for all intents and purposes creates a "captive audience" situation in the Dubuque area. A higher toll would, however, place an unreasonable financial burden on those persons dependent on the Dubuque crossings for work trips or other necessary trans-river movements. Therefore, the toll schedule recommended for the proposed bridges based on a free Julien Dubuque crossing is also proposed for those crossing programs which include imposition of tolls on the present Julien Dubuque Bridge. The same toll on all crossings would act to enhance equal development opportunities throughout the Dubuque area. It should be recognized, however, that under an all-toll situation, a higher toll could be charged which would result in increased total trans-river revenues.

The recommended toll schedule is based upon a per-axle toll of $0.10 which will provide maximum control and auditing benefits as well as being easily understood by bridge users. Under the proposed toll schedule, two-axle vehicles would pay $0.20 for each crossing, three-axle vehicles or vehicle combinations would be assessed $0.30, four-axle vehicles — $0.40 and five-axle vehicles — $0.50.

Estimated Base Year, 1967, Traffic Assignments

The number of motorists that would use the proposed Dubuque bridges at 1967, (base year) traffic levels, was estimated based upon relative trip costs via the present Julien Dubuque Bridge versus the new bridges. In addition, possible diversion from or to the closest fixed crossings to the north and south was studied.

Previous studies indicate a good correlation between the ratio of road-user costs and the proportion of vehicles that will use the alternate routes available. In general, an equal trip cost indicates an equal division of the traffic movement between the proposed facility and a present bridge. A higher ratio of road-user cost for use of the new bridge, to cost via the best competitive routing, indicates a low percentage of traffic assignable to the proposed facility. Conversely, a low ratio of road-user costs using the new facility to cost via the most competitive alternate routing indicates that a high percentage of traffic is divertible.

The travel time and distance studies made during the field phases of this project were used as the basis for assigning trip times and distances via the alternate crossings. The travel patterns determined from the 1965 Origin and Destination Traffic Report prepared by the Iowa State Highway Commission for the Dubuque urban area were adjusted to represent a 1967 average daily traffic level. Each movement considered in anyway potential to the proposed toll bridges was then independently analyzed to determine relative trip times, distances and total costs via the new bridge versus the best available crossing. Using empirical diversion curves developed from similar studies, a redistribution of present trans-river travel patterns was determined for each of the seven alternative bridge construction programs.

In 1967, an average of 15,870 trips per day were made over the two present bridges in Dubuque. The trans-river crossing redistribution for each of the seven alternate bridge programs is shown in Table II-11. The significance of the Julien Dubuque Bridge remaining as a toll-free crossing or being incorporated into the alternative bridge construction programs as a toll crossing is

TABLE II-11

ESTIMATED BASE YEAR (1967) DIVERTED TRAFFIC

Average Daily Traffic

	VEHICLE TOLL CLASS				
	Two-Axle	Three-Axle	Four-Axle	Five-Axle	TOTAL
Bridge Program I					
Eagle Point	2,632	55	25	41	2,753
Julien Dubuque (Free)	11,673	110	110	305	12,198
U. S. Route 20 Bypass	741	36	31	111	919
Total Trans-River	15,046	201	166	457	15,870
Bridge Program II					
Eagle Point	4,155	57	48	114	4,374
Julien Dubuque (Toll)	8,838	92	92	184	9,206
U. S. Route 20 Bypass	942	28	16	175	1,161
Total Trans-River	13,935	177	156	473	14,741
Bridge Program III					
Eagle Point	3,376	46	39	93	3,554
Mid-Town	4,202	61	44	43	4,350
Julien Dubuque (Toll)	5,449	57	57	113	5,676
U. S. Route 20 Bypass	942	28	16	175	1,161
Total Trans-River	13,969	192	156	424	14,741
Bridge Program IV					
City Island (Two-Lane)	2,973	62	28	47	3,110
Julien Dubuque (Free)	11,332	107	106	296	11,841
U. S. Route 20 Bypass	741	36	31	111	919
Total Trans-River	15,046	205	165	454	15,870

(continued next page)

TABLE II-11 (Cont'd)

	VEHICLE TOLL CLASS				
	Two-Axle	Three-Axle	Four-Axle	Five-Axle	TOTAL
Bridge Program V					
City Island (Two-Lane)	5,215	71	60	143	5,489
Julien Dubuque (Toll)	7,767	81	81	162	8,091
U. S. Route 20 Bypass	942	28	16	175	1,161
Total Trans-River	13,924	180	157	480	14,741
Bridge Program VI					
City Island (Four-Lane)	2,973	62	28	47	3,110
Julien Dubuque (Free)	11,332	107	106	296	11,841
U. S. Route 20 Bypass	741	36	31	111	919
Total Trans-River	15,046	205	165	454	15,870
Bridge Program VII					
City Island (Four-Lane)	5,215	71	60	143	5,489
Julien Dubuque (Toll)	7,767	81	81	162	8,091
U. S. Route 20 Bypass	942	28	16	175	1,161
Total Trans-River	13,924	180	157	480	14,741

clearly shown. It is estimated that a decrease of over 1,100 trans-river trips per day would occur if the Julien Dubuque Bridge were made toll. This decrease in total trans-river trip production would result from some car-pooling of work trips and a decrease in non-essential social-recreational movements. A determination of the magnitude of this toll impact, or travel decrease, was based largely upon experience on comparable facilities. Different toll impact values were assigned for work trips and for motorists making trips for other purposes such as shopping, social and recreational, etc.

As shown in Table II-11, imposition of a toll on the Julien Dubuque Bridge would measurably reduce present traffic on the crossing. Bridge Programs I and II comprise the same facilities (Eagle Point-Julien Dubuque-U. S. Route 20 Bypass) but under free conditions on the Julien Dubuque Bridge it would carry an estimated 12,198 vehicles per day and under toll conditions — 9,206. Even greater relief would be provided with either a Mid-Town or City Island crossing due to their relative proximity to the present bridge.

Estimated Annual Traffic and Revenues

Annual growth in usage of the proposed Dubuque bridges was estimated based upon normal increases in trans-river traffic which might be anticipated over the next several years and on generated and development traffic. Generated traffic consists of additional trips made by motorists now traveling in the bridge corridor, solely due to the convenience and attractiveness of the new facilities. Development traffic is growth in residential, commercial and industrial activity resulting from the location and access advantages afforded by and directly attributed to the proposed bridge.

Normal growth was based upon trends in use of the existing Eagle Point and Julien Dubuque Bridges. In addition, trends and projected changes in population and other economic parameters in the bridge study area were considered in developing the normal growth estimates.

It is estimated that traffic on the proposed Eagle Point Bridge will increase an average of 5.0 per cent per year between 1967 and 1971, decreasing to 4.0 per cent per year between 1971 and 1976, to 3.0 per cent annually from 1976 to 1981 and 2.5 per cent per year through 1985. Normal traffic growths on the U. S. Route 20 Bypass are estimated to average 4.0 per cent per year from 1967 to 1977, decreasing to 3.5 per cent annually between 1977 and 1981 and to 2.5 per cent per year between 1981 and 1985.

Normal traffic growth on the proposed City Island Bridge is estimated at 4.5 per cent annually from 1967 to 1971, decreasing to 4.0 per cent per

year between 1971 and 1976, to 3.0 per cent per year between 1976 and 1981 and to 2.5 per cent annually from 1981 to 1985. The Julien Dubuque Bridge is estimated to experience a normal traffic growth of 4.0 per cent per year from 1967 to 1971, decreasing to 3.5 per cent per year between 1971 and 1976, to 3.0 per cent between 1976 and 1981 and to 2.5 per cent annually between 1981 and 1985. For purposes of conservatism, no trans-river traffic growth was projected beyond 1985, although some increase in traffic is anticipated.

Induced or generated and development growth was estimated based on experience during the early years of operation of similar facilities. An induced growth of ten per cent during the first full year of operation was estimated for the Eagle Point, Mid-Town and City Island crossings, decreasing to 5.0 per cent during the second year of operation. The U. S. Route 20 Bypass Bridge was estimated to realize induced growths of 20.0, 10.0 and 5.0 per cent during the first, second and third years of operation, respectively. No induced traffic was estimated for the present Julien Dubuque Bridge.

As shown in Table II-12, first year traffic on the various bridges would range from a low of 1,290 vehicles per day on the U. S. Route 20 Bypass under Bridge Program I to 14,270 vehicles daily on the Julien Dubuque Bridge (Free), also under Bridge Program I. Maximum relief to the Julien Dubuque Bridge would occur under Bridge Program III with estimated first year daily traffic volumes of 6,640 on the Julien Dubuque Bridge (toll), 5,600 on the Mid-Town Bridge, 4,750 on the proposed Eagle Point Bridge and 1,630 on the U. S. Route 20 Bypass Bridge.

First year and average annual toll revenues for the seven alternative bridge construction programs are also shown in Table II-12. The affect of imposing tolls on the Julien Dubuque crossing on total trans-river revenues is apparent. For example, total revenues under Bridge Program I, with the Julien Dubuque Bridge (free) are estimated at $396,000 in the first year of operation; under an all-toll proposal, revenues would increase to an estimated $1,422,000. At first year levels, Bridge Program III (Eagle Point-Mid-Town-Julien Dubuque-U. S. Route 20 Bypass) would produce slightly more revenues than Bridge Programs

TABLE II-12

ESTIMATED TRAFFIC AND NET REVENUES
ALTERNATIVE BRIDGE CONSTRUCTION PROGRAMS

	AVERAGE DAILY TRAFFIC			GROSS TOLL REVENUES		MAINTENANCE AND OPERATION COSTS[2]		NET TOLL REVENUES	
	Base Year	First Year[1]	Fifteenth Year[1]	First Year[1]	28-Year Average	First Year[1]	28-Year Average	First Year[1]	28-Year Average
	(1967)	(1971)	(1985)						
Bridge Program I									
Eagle Point	2,753	3,680	6,020	$ 280,000	$ 415,000	$ 70,000	$111,000	$ 210,000	$ 304,000
Julien Dubuque (Free)	12,198	14,270	21,690	—	—	—	—	—	—
U. S. Route 20 Bypass	919	1,290	2,390	116,000	193,000	60,000	91,000	56,000	102,000
Total Trans-River	15,870	19,240	30,100	$ 396,000	$ 608,000	$130,000	$202,000	$ 266,000	$ 406,000
Bridge Program II									
Eagle Point	4,374	5,850	9,560	$ 451,000	$ 668,000	$ 70,000	$111,000	$ 381,000	$ 557,000
Julien Dubuque (Toll)	9,206	10,770	16,370	822,000	1,135,000	130,000	202,000	692,000	933,000
U. S. Route 20 Bypass	1,161	1,630	3,020	149,000	247,000	60,000	90,000	89,000	157,000
Total Trans-River	14,741	18,250	28,950	$1,422,000	$2,050,000	$260,000	$403,000	$1,162,000	$1,647,000
Bridge Program III									
Eagle Point	3,554	4,750	7,770	$ 367,000	$ 543,000	$ 70,000	$111,000	$ 297,000	$ 432,000
Mid-Town	4,350	5,600	8,850	422,000	606,000	70,000	111,000	352,000	495,000
Julien Dubuque (Toll)	5,676	6,640	10,090	507,000	700,000	130,000	202,000	377,000	498,000
U. S. Route 20 Bypass	1,161	1,630	3,020	149,000	247,000	60,000	90,000	89,000	157,000
Total Trans-River	14,741	18,620	29,730	$1,445,000	$2,096,000	$330,000	$514,000	$1,115,000	$1,582,000

(continued next page)

(1) Twelve-month period beginning July 1.
(2) Estimated by Howard, Needles, Tammen & Bergendoff.

V and VII (City Island-Julien Dubuque-U. S. Route 20 Bypass) and Bridge Program II (Eagle Point-Julien Dubuque-U. S. Route 20 Bypass).

Detailed traffic and revenue tables for Bridge Programs II and V are presented in the Appendix. These include tables showing estimated annual traffic and toll revenues for each crossing under the two Bridge Programs.

PRELIMINARY PROJECT FEASIBILITY

Net toll revenues derived from the proposed Dubuque alternative bridge construction programs were determined by deducting the estimated annual maintenance and operating costs developed by Howard, Needles, Tammen & Bergendoff from toll revenues anticipated from the projects. Preliminary project feasibility computations were then made by relating estimated net revenues to the maximum interest and level debt service requirements of a bond issue sufficient to meet the estimated capital costs of the proposed bridges.

Estimated Annual Net Revenues

Estimated annual net revenues for the alternative Bridge Programs are presented in Table II-12. In the first full year of operation, the twelve-month period beginning July 1, 1971, net revenues of $266,000 are estimated for Bridge Program I increasing to an average of $406,000 over the 28-year earning period. This proposal was the lowest revenue producer of the seven studied.

The highest net revenue proposal is Bridge Program V, (a two-lane City Island Bridge, a toll Julien Dubuque Bridge and a U. S. Route 20 Bypass Bridge) with total first year net revenues of $1,166,000 increasing to an average of $1,664,000 over the 28-year earning period. Annual estimated maintenance and operation cost and net revenue tables for each crossing under Bridge Programs II and V are included in the Appendix.

Preliminary Project Feasibility

There are two "tests" which financial advisors normally employ to determine a relative range of feasibility of a toll project. The first test is the coverage of maximum or first year interest by first year net revenues; the second test is the coverage of level debt service by average annual net revenues over the earning period of an assumed bond issue.

As a measure of feasibility, financial interests normally assume a first year net revenue coverage of maximum interest of 1.20 to be satisfactory. An average annual net revenue coverage of level debt service greater than 1.50 is normally considered indicative of financial feasibility.

The feasibility computations shown in Table II-13 were developed assum-

TABLE II-13

PRELIMINARY PROJECT FEASIBILITY — ALTERNATIVE BRIDGE CONSTRUCTION PROGRAMS

Bond Term — 30 Years Bond Earning Period — 28 Years Bond Interest Rate — 5.5 Per cent

	PRELIMINARY PROJECT COSTS[1]	ESTIMATED BOND ISSUE	FIRST YEAR INTEREST	LEVEL DEBT SERVICE 28 YEARS	ESTIMATED FIRST YEAR NET REVENUES	ESTIMATED ANNUAL NET REVENUES 28 YEARS	COVERAGES: First Year Interest by First Year Net Revenues	COVERAGES: Level Debt Service By Average Annual Net Revenues 28 Years	TOTAL SUBSIDY OR (DEFICIT) REQUIRED
Bridge Program I									
Eagle Point	$ 4,380,000	$ 5,256,000	$ 289,000	$ 372,000	$ 210,000	$ 304,000	0.73	0.82	($ 1,904,000)
Julien Dubuque (Free)	—	—	—	—	—	—	—	—	—
U. S. Route 20 Bypass	6,593,000	7,912,000	435,000	560,000	56,000	102,000	0.13	0.18	(12,824,000)
Total Trans-River	$10,973,000	$13,168,000	$ 724,000	$ 932,000	$ 266,000	$ 406,000	0.37	0.44	($14,728,000)
Bridge Program II									
Eagle Point	$ 4,380,000	$ 5,256,000	$ 289,000	$ 372,000	$ 381,000	$ 557,000	1.32	1.50	$ 5,171,000
Julien Dubuque (Toll)	400,000	480,000	27,000	34,000	692,000	933,000	25.63	27.44	25,169,000
U. S. Route 20 Bypass	6,593,000	7,912,000	435,000	560,000	89,000	157,000	0.20	0.28	(11,294,000)
Total Trans-River	$11,373,000	$13,648,000	$ 751,000	$ 966,000	$1,162,000	$1,647,000	1.55	1.70	$19,046,000
Bridge Program III									
Eagle Point	$ 4,380,000	$ 5,256,000	$ 289,000	$ 372,000	$ 297,000	$ 432,000	1.03	1.16	$ 1,680,000
Mid-Town	5,038,000	6,046,000	333,000	428,000	352,000	495,000	1.06	1.16	1,876,000
Julien Dubuque (Toll)	400,000	480,000	27,000	34,000	377,000	498,000	13.96	14.65	12,992,000
U. S. Route 20 Bypass	6,593,000	7,912,000	435,000	560,000	89,000	157,000	0.20	0.28	(11,284,000)
Total Trans-River	$16,411,000	$19,694,000	$1,084,000	$1,394,000	$1,115,000	$1,582,000	1.03	1.13	$ 5,264,000

(Continued next page)

(1) Estimated by Howard, Needles, Tammen & Bergendoff.

TABLE II-13 (Cont'd)

	PRELIMINARY PROJECT COSTS[1]	ESTIMATED BOND ISSUE	FIRST YEAR INTEREST	LEVEL DEBT SERVICE 28 YEARS	ESTIMATED FIRST YEAR NET REVENUES	ESTIMATED ANNUAL NET REVENUES 28 YEARS	COVERAGES: First Year Interest by First Year Net Revenues	COVERAGES: Level Debt Service By Average Annual Net Revenues 28 Years	TOTAL SUBSIDY OR (DEFICIT) REQUIRED
Bridge Program IV									
City Island (Two-Lane)	$ 7,000,000	$ 8,400,000	$ 462,000	$ 595,000	$ 240,000	$ 348,000	0.52	0.58	(6,916,000)
Julien Dubuque (Free)	—	—	—	—	—	—	—	—	—
U. S. Route 20 Bypass	6,593,000	7,912,000	435,000	560,000	56,000	102,000	0.13	0.18	(12,824,000)
Total Trans-River	$13,593,000	$16,312,000	$ 897,000	$1,155,000	$ 296,000	$ 450,000	0.33	0.39	($19,740,000)
Bridge Program V									
City Island (Two-Lane)	$ 7,000,000	$ 8,400,000	$ 462,000	$ 595,000	$ 485,000	$ 711,000	1.05	1.19	$ 3,235,000
Julien Dubuque (Toll)	400,000	480,000	27,000	34,000	592,000	796,000	21.93	23.41	21,326,000
U. S. Route 20 Bypass	6,593,000	7,912,000	435,000	560,000	89,000	157,000	0.20	0.28	(11,294,000)
Total Trans-River	$13,993,000	$16,792,000	$ 924,000	$1,189,000	$1,166,000	$1,664,000	1.26	1.40	$13,267,000
Bridge Program VI									
City Island (Four-Lane)	$12,445,000	$14,934,000	$ 821,000	$1,058,000	$ 210,000	$ 308,000	0.26	0.29	($21,000,000)
Julien Dubuque (Free)	—	—	—	—	—	—	—	—	—
U. S. Route 20 Bypass	6,593,000	7,912,000	435,000	560,000	56,000	102,000	0.13	0.18	(12,824,000)
Total Trans-River	$19,038,000	$22,846,000	$1,256,000	$1,618,000	$ 266,000	$ 410,000	0.21	0.25	($33,824,000)
Bridge Program VII									
City Island (Four-Lane)	$12,445,000	$14,934,000	$ 821,000	$1,058,000	$ 445,000	$ 651,000	0.54	0.62	($11,396,000)
Julien Dubuque (Toll)	400,000	480,000	27,000	34,000	592,000	796,000	21.93	23.41	21,336,000
U. S. Route 20 Bypass	6,593,000	7,912,000	435,000	560,000	89,000	157,000	0.20	0.28	(11,284,000)
Total Trans-River	$19,438,000	$23,326,000	$1,283,000	$1,652,000	$1,207,000	$1,604,000	0.94	0.97	($ 1,344,000)

ing a bond interest rate of 5.5 per cent and a bond term of 30 years. The escalation from project costs to bond issue includes such financing items as bond discount, legal and financial fees, capitalized interest during construction, etc. Based on the relationship of project costs to bond issue size of several comparable projects which have been financed, a factor of 1.2 was applied to project costs to determine a preliminary bond issue.

As shown in Table II-13, Bridge Program II (Eagle Point-toll Julien Dubuque-U. S. Route 20 Bypass) has the highest coverage of level debt service by average annual net revenues — 1.70. The next most feasible proposal is Bridge Program V (two-lane City Island-toll Julien Dubuque-U. S. Route 20 Bypass) with a coverage of 1.40. This would be followed by Bridge Programs III, VII, I, IV and VI, in order. The last three, and most unfeasible Programs, all include a free Julien Dubuque Bridge.

It should be emphasized, however, that the above computations were developed only as a guide and that a final determination of project feasibility should be made by financial advisors selected for this purpose.

Relationship Between Level Debt Service and Net Revenues

Three of the bridge construction programs would reflect a surplus of net revenues over level debt service. As shown in Table II-13, the total surplus for Bridge Program II is estimated at $19,046,000, for Bridge Program V — $13,267,000 and for Bridge Program III — $5,264,000. The remaining bridge programs would return less net revenues than level debt service. The subsidy required would range from $1,344,000 for Bridge Program VII to $33,824,000 for Bridge Program VI. Tables showing the relationship of annual net revenues to level debt service for the two most feasible Bridge Programs, II and V, are shown in the Appendix.

APPENDIX

Iowa Senate File 131

The General Bridge Act

Chap. CCXLVI - 39th Congress

Chap. 34 - 56th Congress

Tables

STATE HIGHWAY COMMISSION – INTERSTATE BRIDGES
SENATE FILE 131

AN ACT AUTHORIZING THE STATE HIGHWAY COMMISSION TO ACQUIRE, PURCHASE AND CONSTRUCT INTERSTATE BRIDGES, APPROACHES THERETO AND SITES THEREFOR, TO RECONSTRUCT, COMPLETE, IMPROVE, REPAIR, REMODEL, CONTROL, MAINTAIN, AND OPERATE INTERSTATE BRIDGES, TO ESTABLISH TOLLS AND CHARGES FOR THE USE OF INTERSTATE BRIDGES, TO BORROW MONEY AND ISSUE BONDS PAYABLE SOLELY FROM THE REVENUES DERIVED FROM THE OPERATION OF INTERSTATE BRIDGES, AND TO REFUND BONDS PAYABLE FROM SUCH REVENUES.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF IOWA:

Section 1. The following words or terms, as used in this Act, shall have the respective meanings as stated:

"Toll bridge" shall mean an interstate bridge constructed, purchased or acquired under the provisions of this Act, upon which tolls are charged, together with all appurtenances, additions, alterations, improvements, and replacements thereof, and the approaches thereto, and all lands and interests therein used therefor, and buildings and improvements thereon.

"Commission" shall mean the state highway commission, the agency of the state of Iowa created and provided for under the provisions of chapter three hundred seven (307) of the Code.

"Construct, constructing, construction or constructed" shall include the reconstruction, remodeling, repair, or improvement of any existing toll bridge as well as the construction of any new toll bridge.

"Acquisition by purchase, gift, or condemnation" as used in this Act shall mean acquisition by the state highway commission, whether such terms "purchase, gift, or condemnation" are used singularly or in sequence.

Section 2. The state highway commission shall have full charge of the construction and acquisition of all toll bridges constructed or acquired under the provisions of this Act, the operation and maintenance thereof and the imposition and collection of tolls and charges for the use thereof. The commission shall have full charge of the design of all toll bridges constructed under the provisions of this Act. The commission shall proceed with the construction of such toll bridges and other facilities and the approaches thereto by contract immediately upon there being made available funds for such work and shall prosecute such work to completion as rapidly as practicable. The commission shall advertise for bids for the construction, reconstruction, improvement, repair or remodeling of any toll bridge by publication of a notice once each week for at least two (2) consecutive weeks in a newspaper published and having a general circulation throughout the state of Iowa, the first publication to appear at least fifteen (15) days prior to the date set for receiving bids. The commission shall have the power to accept such offer or offers, propositions or bids, and enter into such contract or contracts as it shall deem to be to the best interest of the state.

Section 3. The commission is hereby authorized to establish and construct toll bridges upon any public highway, together with approaches thereto, wherever it is considered necessary or advantageous and practical for crossing any navigable river between this state and an adjoining state. The necessity or advantage and practicality of any toll bridge shall be determined by the commission. To obtain information for the consideration of the commission upon the construction of any toll bridge or any other matter pertaining thereto, any officer or employee of the state, upon the request of the commission, shall make reasonable examination, investigation, survey, or reconnaissance to determine material facts pertaining thereto and shall report such findings to the commission. The cost thereof shall be borne by the department or office conducting it from funds provided for its functions.

Section 4. The commission is hereby authorized to enter into agreements with any federal bridge commission or any county, city, or town of this state, and with an adjoining state or county, city, or town thereof, for the purpose of implementing an investigation of the feasibility of any toll bridge project for the bridging of a navigable river forming a portion of the boundary of this state and such adjoining state. The commission may use any funds available for the purposes of this section. Such agreements may provide that in the event any such project is determined to be feasible and adopted, any advancement of funds by any state, county, city, or town may be reimbursed out of any proceeds derived from the sale of bonds or out of tolls and revenues to be derived from such project.

Section 5. Whenever the commission deems it necessary or advantageous and practical, it may acquire by gift, purchase, or condemnation any interstate bridge which connects with or may be connected with the public highways and the approaches thereto, except that the commission may not condemn an existing interstate bridge used for interstate highway traffic and combined highway and railway traffic and presently owned by a municipality, or a person, firm, or corporation engaged in interstate commerce. In connection with the acquisition of any such bridge, the commission and any federal bridge commission or any city, town, county, or other political subdivision of the state are authorized to do all acts and things as in this Act are provided for the establishing and constructing of toll bridges and operating, financing, and maintaining such bridges insofar as such powers and requirements are applicable to the acquisition of any toll bridge and its operation, financing, and maintenance. In so doing, they shall act in the same manner and under the same procedures as provided for establishing, constructing, operating, financing, and maintaining toll bridges insofar as such manner and procedures are applicable. Without limiting the generality of the above provisions, the commission is hereby authorized to cause surveys to be made to determine the propriety of acquiring any such bridge and the rights-of-way necessary therefor, and other facilities necessary to carry out the provisions hereof; to issue, sell, redeem bonds or issue and exchange bonds with present holders of outstanding bonds of bridges being acquired under the provisions of this Act and deposit and pay out of the proceeds of the bonds for the financing thereof; to impose, collect, deposit, and expend tolls therefrom; to secure and remit financial and other assistance in connection with the purchase thereof, and to carry insurance thereon.

Section 6. The commission, its officials, and all state officials are hereby authorized to perform such acts and make such agreements consistent with the law which are necessary and desirable in connection with the duties and powers conferred upon them regarding the construction, maintenance, and operation and insurance of toll bridges or the safeguarding of the funds and revenues required for such construction and the payment of the indebtedness incurred therefor. The commission shall adopt such rules and regulations in accordance with the provisions of chapter seventeen A (17A) of the Code as it may deem necessary for the administration and exercise of its powers and duties granted by this Act, and shall prepare annual financial statements regarding the operation of such toll bridges which shall be made available for inspection by the public and by the holders of revenue bonds issued by the commission under the provisions of this Act at all reasonable times.

Section 7. Whenever the commission deems it to be in the best interest of the primary highway system that any new toll bridge be constructed upon any public highway and across any navigable river between this state and an adjoining state, the commission shall adopt a resolution declaring that the public interest and necessity require the construction of such toll bridge and authorizing the issuance of revenue bonds in an amount sufficient for the purpose of obtaining funds for such construction. The issuance of bonds as provided in this Act for the construction, purchase, or acquisition of more than one (1) toll ridge may, at the discretion of the commission, be included in the same authority and issue or issues of bonds, and the commission is hereby authorized to pledge the gross revenues derived from the operation of any such toll bridge under its control and jurisdiction to pay the principal of and interest on bonds issued to pay the cost of purchasing, acquiring, or constructing any such toll bridge financed under the provisions of this Act. The commission is hereby granted wide discretion, in connection with the financing of the cost of any toll bridge, to pledge the gross revenues of a single toll bridge for the payment of bonds and interest thereon issued to pay the cost of such bridge and to pledge the gross revenues of two (2) or more toll bridges to pay bonds issued to pay the cost of one (1) or more toll bridges and interest thereon as long as the several bridges included herein are not more than ten (10) miles apart.

In addition, if the commission in its discretion determines that the construction of a toll bridge cannot be financed entirely through revenue bonds and that the construction of such toll bridge is necessary, the commission may advance funds from the primary highway fund to pay for that part of the construction cost, including the cost of approaches and all incidental costs, which is not paid out of the proceeds of revenue bonds. After all revenue bonds and interest thereon issued and sold pursuant to this Act and payable from the tolls and revenues of said bridge have been fully paid and redeemed or funds sufficient to pay said bonds and interest, including premium, if any, have been set aside and pledged for that purpose, then such amount advanced from the primary road fund shall be repaid to the primary road fund from the tolls and revenues of said bridge before said bridge is made a toll free bridge under the provisions of this Act.

Section 8. Whenever the commission shall authorize the construction of any toll bridge, the commission is empowered to secure rights-of-way therefor and for approaches thereto by gift or purchase or by condemnation in the manner provided by law for the taking of private property for public purposes.

Section 9. The right-of-way is hereby given, dedicated, and set apart upon which to locate, construct, and maintain toll bridges or approaches thereto or other highway crossings, and transportation facilities thereof or thereto, through, over or across any of the lands which are now or may be the property of this state, including highways; and through, over, or across the streets, alleys, lanes, and roads within any city, town, county, or other political subdivision of the state. If any property belonging to any city, town, county or other political subdivision of the state is required to be taken for the construction of any such bridge or approach thereto or should any such property be injured or damaged by such construction, such compensation therefor as may be proper or necessary and as shall be agreed upon may be paid by the commission to the particular county, city, town, or other political subdivision of the state owning such property, or condemnation proceedings may be brought for the determination of such compensation.

Section 10. Before the commission shall proceed with any action to secure right-of-way or with the construction of any toll bridge under the provisions of this Act, it shall first pass a resolution finding that public interest and necessity require the acquisition of right-of-way for and the construction of such toll bridge. Such resolution shall be conclusive evidence of the public necessity of such construction and that such property is necessary therefor. To aid the commission in determining the public interest, a public hearing shall be held in the county or counties of this state in which any portion of a bridge is proposed to be located. Notice of such hearing shall be published at least once in a newspaper published and having a general circulation in the county or counties where such bridge is proposed to be located, not less than twenty (20) days prior to the date of the hearing. When it becomes necessary for the commission to condemn any real estate to be used in connection with any such bridge, or to condemn any existing bridge, such condemnation shall be carried out in a manner consistent with the provisions of chapters four hundred seventy-one (471) and four hundred seventy-two (472) of the Code. In eminent domain proceedings to acquire property for any of the purposes of this Act, any bridge, real property, personal property, franchises, rights, easements, or other property or privileges appurtenant thereto appropriated or dedicated to a public use or purpose by any person, firm, private, public or municipal corporation, county, city or town, district, or any political subdivision of the state, may be condemned and taken, and the acquisition and use thereof as herein provided for the same public use or purpose to which such property has been so appropriated or dedicated, or for any other public use or purpose, shall be deemed a superior and permanent right and necessity, and a more necessary use and purpose than the public use or purpose to which such property has already been appropriated or dedicated, and any condemnation award may be paid from the proceeds of revenue bonds issued under the provisions of this Act.

Section 11. If the commission determines that any toll bridge should be constructed or acquired under its authority, all costs thereof, including land, right-of-way, surveying, engineering, construction, legal and administrative expenses, and fees of any fiscal adviser, shall be paid out of any funds available for payment of the cost of the bridge.

Section 12. The commission is hereby authorized and empowered to issue revenue bonds for the acquisition, purchase or construction of any interstate bridge. Any and all bonds issued by the commission for the acquisition, purchase, or construction of any interstate bridge under the authority of this Act shall be issued in the name of the Iowa highway commission and shall constitute obligations only of the commission, shall be identified by some appropriate name, and shall contain a recital on the face thereof that the payment or redemption of said bonds and the payment of the interest thereon are secured by a direct charge and lien upon the tolls and other revenues of any nature whatever received from the operation of the particular bridge for the acquisition, purchase, or construction of which the bonds are issued and of such other bridge or bridges as may have been pledged therefor, and that neither the payment of the principal or any part thereof nor of the interest thereon or any part thereof constitutes a debt, liability, or obligation of the state of Iowa. When it is determined by the commission to be in the best public interest, any bonds issued under the provisions of this Act may be refunded and refinanced at a lower rate, the same rate or a higher rate or rates of interest and from time to time as often as the commission shall find it to be advisable and necessary so to do. Bonds issued to refund other bonds theretofore issued by the commission under the provisions of this Act may either be sold in the manner hereinafter provided and the proceeds thereof applied to the payment of the bonds being refunded, or the refunding bonds may be exchanged for and in payment and discharge of the bonds being refunded. The refunding bonds may be sold or exchanged in installments at different times or an entire issue or series may be sold or exchanged at one (1) time. Any issue or series or refunding bonds may be exchanged in part or sold in part in installments at different times or at one (1) time. The refunding bonds may be sold at any time on, before, or after the maturity of any of the outstanding bonds to be refinanced thereby and may be issued for the purpose of refunding a like or greater principal amount of bonds, except that the principal amount of the refunding bonds may exceed the principal amount of the bonds to be refunded to the extent necessary to pay any premium due on the call of the bonds to be refunded or to fund interest in arrears or about to become due. The gross revenues of any toll bridge pledged to the payment of the bonds being refunded, together with the unpledged gross revenues of any other toll bridges located within ten (10) miles of said bridge, may be pledged by the commission to pay the principal of and interest on the refunding bonds and to create and maintain reserves therefor.

The commission is empowered to receive and accept funds from the state of Iowa or the federal government or any other state upon a cooperative or other basis for the acquisition, purchase, or construction of any interstate bridge authorized under the provisions of this Act and is empowered to enter into such agreements with the state of Iowa or any other state or the federal government as may be required for the securing of such funds.

The commission is authorized and empowered to spend from annual primary road fund receipts sufficient moneys to pay the cost of operation, maintenance, insurance, collection of tolls and accounting therefor and all other charges incidental to the operation and maintenance of any toll bridge administered under the provisions of this Act.

Section 13. The revenue bonds may be issued and sold or exchanged by the commission from time to time and in such amounts as it deems necessary to provide sufficient funds for the acquisition, purchase, or construction of any such bridge and to pay interest on bonds issued for the construction of any toll bridge during the period of actual construction and for six (6) months after completion thereof. The commission is hereby authorized to adopt all necessary resolutions prescribing the form, conditions, and denominations of the bonds, the maturity dates therefor, and the interest rate or rates which the bonds shall bear. All bonds of the same issue need not bear the same interest rate. Principal and interest of the bonds shall be payable at such place or places within or without the state of Iowa as determined by the commission, and the bonds may contain provisions for registration as to principal or interest, or both. Interest shall be payable at such times as determined by the commission and the bonds shall mature at such times and in such amounts as the commission prescribes. The commission may provide for the retirement of the bonds at any time prior to maturity, and in such manner and upon payment of such premiums as it may determine in the resolution providing for the issuance of the bonds. All such bonds and any coupons attached thereto shall be signed by such officials of the commission as the commission may direct. Successive issues of such bonds within the limits of the original authorization shall have equal preference with respect to the payment of the principal thereof and the payment of interest thereon. The commission may fix different maturity dates, serially or otherwise, for successive issues under any one (1) original authorization. All bonds issued under the provisions of this Act shall have all the qualities of negotiable instruments under the laws of the state of Iowa. All bonds issued and sold hereunder shall be sold to the highest and best bidder on the basis of sealed proposals received pursuant to a notice specifying the time and place of sale and the amount of bonds to be sold which shall be published at least once not less than seven (7) days prior to the sale in a newspaper published in the state of Iowa and having a general circulation in said state. None of the provisions of chapter seventy-five (75) of the Code shall apply to bonds issued under the provisions of this Act but such bonds shall be sold upon terms of not less than par plus accrued interest. The commission may reject any or all bids received at the public sale and may thereafter sell the bonds at private sale on such terms and conditions as it deems most advantageous to its own interests, but not at a price below that of the best bid received at the advertised sale. The commission may enter into contracts and borrow money through the sale of bonds of the same character as those herein authorized, from the United States or any agency thereof, upon such conditions and terms as may be agreed to and the bonds shall be subject to all the provisions of this Act, except that any bonds issued hereunder to the United States or any agency thereof need not first be offered at public sale. The commission may also provide for the private sale of bonds issued under the provisions of this Act to the state treasurer of Iowa upon such terms and conditions as may be agreed upon, and in such event said bonds need not first be offered at public sale. Temporary or interim bonds, certificates, or receipts, of any denomination, and with or without coupons attached, signed by such official as the commission may direct, may be issued and delivered until the definitive bonds are executed and available for delivery.

Section 14. The proceeds from the sale of all bonds authorized and issued under the provisions of this Act shall be deposited by the commission in a fund designated as the construction fund of the particular interestate bridge or bridges for which such bonds were issued and sold, which fund shall not be a state fund and shall at all times be kept segregated and set apart from all other funds and in trust for the purposes herein set out. Such proceeds shall be paid out or disbursed solely for the acquisition, purchase, or construction of such interstate bridge or bridges and expenses incident thereto, the acquisition of the necessary lands and easements there-

for and the payment of interest on such bonds during the period of actual construction and for a period of six (6) months thereafter, only as the need therefor shall arise and the commission may agree with the purchaser of said bonds upon any conditions or limitations restricting the disbursement of such funds that may be deemed advisable, for the purpose of assuring the proper application of such funds. All moneys in such fund and not required to meet current construction costs of the interstate bridge or bridges for which such bonds were issued and sold, and all funds constituting surplus revenues which are not immediately needed for the particular object or purpose to which they must be applied or are pledged may be invested in obligations issued or guaranteed by the United States or by any person controlled by or supervised by and acting as an instrumentality of the United States pursuant to authority granted by the congress of the United States; provided, however, that the commission may provide in the proceedings authorizing the issuance of said bonds that the investment of such moneys shall be made only in particular bonds and obligations within the classifications eligible for such investment and such provisions shall thereupon be binding upon the commission and all officials having anything to do with such investment. Any surplus which may exist in said construction fund shall be applied to the retirement of bonds issued for the acquisition, purchase, or construction of any such interstate bridge by purchase or call and, in the event such bonds cannot be purchased at a price satisfactory to the commission and are not by their terms callable prior to maturity, such surplus shall be paid into the fund applicable to the payment of principal and interest of said bonds and shall be used for that purpose. The proceedings authorizing the issuance of bonds may provide limitations and conditions upon the time and manner of applying such surplus to the purchase and call of outstanding bonds and the terms upon which they shall be purchased or called and such limitations and conditions shall be followed and observed in the application and use of such surplus. All bonds so retired by purchase or call shall be immediately canceled.

Section 15. All tolls or other revenues received from the operation of any toll bridge acquired, purchased, or constructed with the proceeds of bonds issued and sold hereunder shall be deposited by the commission to the credit of a special trust fund to be designated as the toll revenue fund of the particular toll bridge or toll bridges producing such tolls or revenue, which fund shall be a trust fund and shall at all times be kept segregated and set apart from all other funds.

Section 16. From the money so deposited in each separate construction fund as hereinabove provided, at the direction of the commission there shall be transferred to the place or places of payment named in said bonds such sums as may be required to pay the interest as it becomes due on all bonds issued and outstanding for the construction of such particular toll bridge or toll bridges during the period of actual construction and during the period of six (6) months immediately thereafter. The commission shall thereafter transfer from each separate toll revenue fund to the place or places of payment named in the bonds for which said revenues have been pledged such sums as may be required to pay the interest on said bonds and redeem the principal thereof as such interest and principal become due. All funds so transferred for the payment of principal of or interest on bonds issued for any particular toll bridge or toll bridges shall be segregated and applied solely for the payment of said principal or interest. The proceedings authorizing the issuance of the bonds may provide for the setting up of a reserve fund or funds out of the tolls and other revenues not needed for the payment of principal and interest, as the same currently matures and for the preservation and continuance of such fund in a manner to be provided therein, and such proceedings may also require the immediate application of all surplus moneys in such toll revenue fund to the retirement of such bonds prior to maturity, by call or purchase, in such manner and upon such terms and the payment of such premiums as may be deemed advisable in the judgment of the commission. The moneys remaining in each separate toll revenue fund after providing the amount required for the payment of principal of and interest on bonds as hereinabove provided, shall be held and applied as provided in the proceedings authorizing the issuance of said bonds. In the event the proceedings authorizing the issuance of said bonds do not require surplus revenues to be held or applied in any particular manner, they shall be allocated and used for such other purposes incidental to the construction, operation, and maintenance of any toll bridge as the commission may determine and as permitted under sections seven (7) and twelve (12) of this Act.

Section 17. Warrants for payments to be made on account of such bonds shall be drawn by the commission on duly approved vouchers. Moneys required to meet the costs of purchase or construction and all expenses and costs incidental to the acquisition, purchase, or construction of any particular interstate bridge or to meet the costs of operating, maintaining, and repairing the same, shall be paid by the commission from the proper fund therefor upon duly approved vouchers. All interest received or earned on money deposited in each and every fund herein provided for shall be credited to and become a part of the particular fund upon which said interest accrues.

Section 18. The commission may provide in the proceedings authorizing the issuance of bonds or may otherwise agree with the purchasers of bonds regarding the deposit of all moneys constituting the construction fund and the toll revenue fund and provide for the deposit of such money at such times and with such depositaries or paying agents and upon the furnishing of such security as may meet with the approval of the purchasers of such bonds.

Section 19. Notwithstanding any provision contained in this Act, the proceeds received from the sale of bonds and the tolls or other revenues received from the operation of any toll bridge may be used to defray any expenses incurred by the commission in connection with and incidental to the issuance and sale of bonds for the acquisition, purchase, or construction of any such toll bridge including expenses for the preparation of surveys and estimates, legal, fiscal and administrative expenses, and the making of such inspections and examinations as may be required by the the purchasers of such bonds; provided, that the proceedings authorizing the issuance of such bonds may contain appropriate provisions governing the use and application of said bond proceeds and toll or other revenues for the purposes herein specified.

Section 20. While any bonds issued by the commission remain outstanding, the powers, duties or existence of the commission or of any other official or agency of the state shall not be diminished or impaired in any manner that will affect adversely the interests and rights of the holders of such bonds. The holder of any bond may by mandamus or other appropriate proceeding require and compel the performance of any of the duties imposed upon any state department, official, or employee or imposed upon the commission or its officers, agents, and employees in connection with the acquisition, purchase, construction, maintenance, operation, and insurance of any bridge and in connection with the collection, deposit, investment, application, and disbursement of all tolls and other revenues derived from the operation and use of any bridge and in connection with the deposit, investment, and disbursement of the proceeds received from the issuance of bonds; provided, that the enumeration of such rights and remedies herein shall not be deemed to exclude the exercise or prosecution of any other rights or remedies by the holders of such bonds.

Section 21. When any toll bridge authorized hereunder is being built by the commission it may carry or cause to be carried such an amount of insurance or indemnity bond or bonds as protection against loss or damage as it may deem proper. The commission is hereby further empowered to carry such an amount of insurance to cover any accident or destruction in part or in whole to any toll bridge. All moneys collected on any indemnity bond or insurance policy as the result of any damage or injury to any such toll bridge shall be used for the purpose of repairing or rebuilding of any such toll bridge as long as there are revenue bonds against any such structure outstanding and unredeemed. The commission is also empowered to carry insurance or indemnity bonds insuring against the loss of tolls or other revenues to be derived from any such toll bridge by reason of any interruption in the use of such toll bridge from any cause whatever, and the proceeds of such insurance or indemnity bonds shall be paid into the fund into which the tolls and other revenues of the bridge thus insured are required to be paid and shall be applied to the same purposes and in the same manner as other moneys in the said fund. Such insurance or indemnity bonds may be in an amount equal to the probable tolls and other revenues to be received from the operation of such toll bridge during any period of time that may be determined upon by the commission and fixed in its discretion, and be paid for out of the toll revenue fund as may be specified in said proceedings. The commission may provide in the proceedings authorizing the issuance of bonds for the carrying of insurance as authorized by this Act and the purchase and carrying of insurance as authorized by this Act shall thereupon be obligatory upon the commission and be paid for out of the toll revenue fund as may be specified in said proceedings.

Section 22. The commission is hereby empowered to fix the rates of toll and other charges for all interstate bridges acquired, purchased, or constructed under the terms of this Act. Toll charges so fixed may be changed from time to time as conditions may warrant. The commission in establishing toll charges shall give due consideration to the amount required annually to pay the principal of and interest on bonds payable from the revenues thereof. The tolls and charges shall be at all times fixed at rates sufficient to pay the bonds and interest as they mature, together with the creation and maintenance of bond reserve funds and other funds as established in the proceedings authorizing the issuance of the bonds, for any particular toll bridge. The amounts required to pay the principal of and interest on bonds shall constitute a charge and lien on all such tolls and other revenues and interest thereon and sinking funds created therefrom received from the use and operation of said toll bridge, and the commission is hereby authorized to pledge a sufficient amount of said tolls and revenues for the payment of bonds issued under the provisions of this Act and interest thereon and to create and maintain a reserve therefor. Such tolls and revenues, together with the interest earned thereon, shall constitute a trust fund for the security and payment of such bonds and shall not be used or pledged for any other purpose as long as such bonds or any of them are outstanding and unpaid.

Section 525. Construction and operation of bridges; consent of Congress; approval of plans; private highway toll bridges.

(a) The consent of Congress is granted for the construction, maintenance, and operation of bridges and approaches thereto over the navigable waters of the United States, in accordance with the provisions of sections 525–533 of this title.

(b) The location and plans for such bridges shall be approved by the Chief of Engineers and the Secretary of the Army before construction is commenced, and, in approving the location and plans of any bridge, they may impose any specific conditions relating to the maintenance and operation of the structure which they may deem necessary in the interest of public navigation, and the conditions so imposed shall have the force of law.

(c) Notwithstanding the provisions of subsections (a) and (b) of this section, it shall be unlawful to construct or commence the construction of any privately owned highway toll bridge until the location and plans thereof shall also have been submitted to and approved by the highway department or departments of the State or States in which the bridge and its approaches are situated; and where such bridge shall be between two or more States and the highway departments thereof shall be unable to agree upon the location and plans therefor, or if they, or either of them, shall fail or refuse to act upon the location and plans submitted, such location and plans then shall be submitted to the Bureau of Public Roads and, if approved by the Bureau of Public Roads, approval by the highway departments shall not be required. (Aug. 2, 1946, ch. 753, title V, Section 502, 60 Stat. 847; June 30, 1949, ch. 288, title I, Section 103 (a), 63 Stat. 380; 1949 Reorg. Plan No. 7, Section 1, eff. Aug. 19, 1949, 14 F. R. 5288, 63Stat. 1070.)

CODIFICATION

The Department of War was designated the Department of the Army and the title of the Secretary of War was changed to Secretary of the Army by section 205 (a) of act July 26, 1947, ch. 343, title II, 61 Stat. 501. Section 205 (a) of act July 26, 1947, was repealed by section 53 of act Aug. 10, 1956, ch. 1041, 70A Stat. 641. Section 1 of act Aug. 10, 1956, enacted "Title 10, Armed Forces", which in sections 3011–3013 continued the military Department of the Army under the administrative supervision of a Secretary of the Army.

SHORT TITLE

Congress in enacting sections 525–533 of this title provided by section 501 of act Aug. 2, 1946 that they should be popularly known as the "General Bridge Act of 1946".

TRANSFER OF FUNCTIONS

The functions of all other officers of the Department of Commerce and the functions of all agencies and employees of such Department were, with a few exceptions, transferred to the Secretary of Commerce, with power vested in him to authorize their performance or the performance of any of his functions by any of such officers, agencies, and employees, by 1950 Reorg. Plan No. 5, Sections 1, 2, eff. May 24, 1950, 15 F.R. 3174, 64 Stat. 1263, set out in note under Section 591 of Title 5, Executive Departments and Government Officers and Employees.

The Public Roads Administration, which was transferred to the Bureau of Public Roads within the General Services Administration, was transferred to the Department of Commerce by 1949 Reorg. Plan No. 7.

All functions of the Public Roads Administration were transferred to the Bureau of Public Roads within the General Services Administration by section 103 (a) of Act June 30, 1949. Section 103 (a) is set out as section 630b (a) of Title 5, Executive Departments and Government Officers and Employees.

RESERVATION OF RIGHT TO ALTER, AMEND, OR REPEAL

Section 511 of act Aug. 2, 1946, provided: "The right to alter, amend, or repeal this title (sections 525–533 of this title) is hereby expressly reserved as to any and all bridges which may be built under authority hereof (said sections)."

Section 526. Amount of tolls.

If tolls shall be charged for the transit over any interstate bridge of engines, cars, street cars, wagons, carriages, vehicles, animals, foot passengers, or other passengers, such tolls shall be reasonable and just, and the Secretary of the Army may, at any time, and from time to time, prescribe the reasonable rates of toll for such transit over such bridge, and the rates so prescribed shall be the legal rates and shall be the rates demanded and received for such transit. (Aug. 2, 1946, ch. 753, title V, Section 503, 60 Stat. 847.)

Section 527. Acquisition of interstate bridges by public agencies; amount of damages.

After the completion of any interstate toll bridge constructed by an individual, firm, or corporation, as determined by the Secretary of the Army, either of the States in which the bridge is located, or any public agency or political subdivision of either of such States, within or adjoining which any part of such bridge is located, or any two or more of them jointly, may at any time acquire and take over all right, title, and interest in such bridge and its approaches, and any interest in real property for public purposes by condemnation or expropriation. If at any time after the expiration of five years after the completion of such bridge the same is acquired by condemnation or expropriation, the amount of damages or compensation to be allowed shall not include good will, going value, or prospective revenues or profits, but shall be limited to the sum of (1) the actual cost of constructing such bridge and its approaches, less a reasonable deduction for actual depreciation in value; (2) the actual costs of acquiring such interests in real property; (3) actual financing and promotion costs, not to exceed 10 per centum of the sum of the cost of constructing the bridge and its approaches and acquiring such interests in real property; and (4) actual expenditures for necessary improvements. (Aug. 2, 1946, ch. 753, title V, Section 504, 60 Stat. 848.)

Section 528. Statement of construction costs of privately owned interstate bridges; investigation of costs; conclusiveness of findings; review.

Within ninety days after the completion of a privately owned interstate toll bridge, the owner shall file with the Secretary of the Army and with the highway departments of the States in which the bridge is located, a sworn itemized statement showing the actual original cost of constructing the bridge and its approaches, the actual cost of acquiring any interest in real property necessary therefor, and the actual financing and promotion costs. The Secretary of the Army may, and upon request of a highway department shall, at any time within three years after the completion of such bridge, investigate such costs and determine the accuracy and the reasonableness of the costs alleged in the statement of costs so filed, and shall make a finding of the actual and reasonable costs of constructing, financing, and promoting such bridge. For the purpose of such investigation the said individual, firm, or corporation, its successors and assigns, shall make available all of its records in connection with the construction, financing, and promotion thereof. The findings of the Secretary of the Army as to the reasonable costs of the construction, financing, and promotion of the bridge shall be conclusive for the purposes mentioned in section 527 of this title subject only to review in a court of equity for fraud or gross mistake. (Aug. 2, 1946, ch. 753, title V, Section 505, 60 Stat. 848.)

Section 529. Sinking funds; rate of tolls, cancellation of tolls.

If tolls are charged for the use of an interstate bridge constructed or taken over or acquired by a State or States or by any municipality or other political subdivision or public agency thereof, under the provisions of sections 525–533 of this title, the rates of toll shall be so adjusted as to provide a fund sufficient to pay for the reasonable cost of maintaining, repairing, and operating the bridge and its approaches under economical management, and to provide a sinking fund sufficient to amortize the amount paid therefor, including reasonable interest and financing cost, as soon as possible under reasonable charges, but within a period of not to exceed thirty years from the date of completing or acquiring the same. After a sinking fund sufficient for such amortization shall have been so provided, such bridge shall thereafter be maintained and operated free of tolls. An accurate record of the amount paid for acquiring the bridge and its approaches, the actual expenditures for maintaining, repairing, and operating the same, and of the daily tolls collected, shall be kept and shall be available for the information of all persons interested. (Aug. 2, 1946, ch. 753, title V, Section 506, 60 Stat. 848; May 25, 1948, ch. 336, 62 Stat. 267.)

AMENDMENTS

1948–Act May 25, 1948, extended the amortization period from 20 to 30 years.

Section 530. Bridges included and excluded.

The provisions of sections 525–533 of this title shall apply only to bridges over navigable waters of the United States, the construction of which is approved after August 2, 1946, under the provisions of said sections; and the provisions of the first proviso of section 401 of this title, and the provisions of sections 491–498 of this title, shall not apply to such bridges. (Aug. 2, 1946, ch. 753, title V, Section 507, 60 Stat. 849.)

Section 531. International bridges.

Sections 525–533 of this title shall not be construed to authorize the construction of any bridge which will connect the United States, or any Territory or possession of the United States, with any foreign country. (Aug. 2, 1946, ch. 753, title V, Section 508, 60 Stat. 849.)

Section 532. Eminent domain.

There are conferred upon any individual, his heirs, legal representatives, or assigns, any firm or corporation, its successors or assigns, or any State, political subdivision, or municipality authorized in accordance with the provisions of sections 525–533 of this title to build a bridge between two or more States, all such rights and powers to enter upon lands and acquire, condemn, occupy, possess, and use real estate and other property in the respective States needed for the location, construction, operation, and maintenance of such bridge and its approaches, as are possessed by railroad corporations for railroad purposes or by bridge corporations for bridge purposes in the State in which such real estate or other property is situated, upon making just compensation therefore to be ascertained and paid according to the laws of such State, and the proceedings therefor shall be the same as in the condemnation or expropriation of property for public purposes in such State. (Aug. 2, 1946, ch. 753, title V, Section 509, 60 Stat. 849.)

Section 533. Penalties.

Any person who fails or refuses to comply with any lawful order of the Secretary of the Army or the Chief of Engineers issued under the provisions of sections 525–533 of this title, or who fails to comply with any specific condition imposed by the Chief of Engineers and the Secretary of the Army relating to the maintenance and operation of bridges, or who refuses to produce books, papers, or documents in obedience to a subpena or other lawful requirement under said sections, or who otherwise violates any provisions of said sections, shall, upon conviction thereof, be punished by a fine of not to exceed $5,000 or by imprisonment for not more than one year, or by both such fine and imprisonment. (Aug. 2, 1946, ch. 753, title V, Section 510, 60 Stat. 849.)

Section 534. Conveyance of right, title, and interest of United States in bridges transferred to States or political subdivisions; terms and conditions.

The Secretary of the Army is authorized to transfer or convey to State authorities or political subdivisions thereof all right, title, and interest of the United States, in and to any and all bridges heretofore or hereafter constructed or acquired in connection with the improvement of canals, rivers and harbors, or works of flood control, together with the necessary lands, easements, or rights-of-way, upon such terms and conditions and with or without consideration, as may be determined to be in the best interest of the United States by the Chief of Engineers: Provided, That such transferred bridges shall be toll-free. (May 17, 1950, ch. 188, title I, Section 109, 64 Stat. 168.)

CODIFICATION

Section was not enacted as a part of the General Bridge Act of 1946 which comprises sections 525–533 of this title.

THIRTY-NINTH CONGRESS

CHAP. CCXLVI

SESSION I

An Act to authorize the Construction of certain Bridges, and to establish them as Post Roads.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That it shall be lawful for any person or persons, company or corporation, having authority from the States of Illinois and Missouri for such purpose, to build a bridge across the Mississippi River at Quincy, Illinois, and to lay on and over said bridge railway tracks, for the more perfect connection of any railroads that are or shall be constructed to the said river at or opposite said point, and that when constructed all trains of all roads terminating at said river, at or opposite said point, shall be allowed to cross said bridge for reasonable compensation, to be made to the owners of said bridge, under the limitations and conditions hereinafter provided. And in case of any litigation arising from any obstruction or alleged obstruction to the free navigation of said river, the cause may be tried before the district court of the United States of any State in which any portion of said obstruction or bridge touches.

Sec. 2. **And be it further enacted,** That any bridge built under the provisions of this act, at the option of the company building the same, be built as a drawbridge, with a pivot or other form of draw, or with unbroken or continuous spans: **Provided,** That if the said bridge shall be made with unbroken and continuous spans, it shall not be of less elevation in any case than fifty feet above extreme high-water mark, as understood at the point of location, to the bottom chord of the bridge, nor shall the spans of said bridge be less than two hundred and fifty feet in length, and the piers of said bridge shall be parallel with the current of the river, and the main span shall be over the main channel of the river and not less than three hundred feet in length: **And provided also,** That if any bridge built under this act shall be constructed as a drawbridge, the same

Sec. 10. **And be it further enacted,** That any company authorized by the legislature of Missouri may construct a bridge across the Missouri River, at the city of Kansas, upon the same terms and conditions provided for in this act.

Sec. 11. **And be it further enacted,** That the "Saint Louis and Illinois Bridge Company," a corporation organized under an act of the general assembly of the State of Missouri, approved February fifth, eighteen hundred and sixty-four, and an act amendatory of the same, approved February twentieth, eighteen hundred and sixty-five, and also confirmed in its corporate powers under an act of the legislature of the State of Illinois, approved eighteen hundred and sixty-four, or any other bridge company organized under the laws of Missouri and Illinois, be, and the same is hereby, empowered to erect, maintain, and operate a bridge across the Mississippi River, between the city of Saint Louis, in the State of Missouri, and the city of East Saint Louis, in the State of Illinois, subject to all the conditions contained in said act of incorporation and amendments thereto, and not inconsistent with the following terms and provisions contained in this act. And in case of any litigation arising from any obstruction or alleged obstruction to the free navigation of said waters, the cause may be tried before the district court of the United States of any State in which any portion of said obstruction or bridge touches.

Sec. 12. **And be it further enacted,** That the bridge authorized by the preceeding section to be built shall not be a suspension bridge or drawbridge, with pivot or other form of draw, but shall be constructed with continuous or unbroken spans, and subject to these conditions: First, that the lowest part of the bridge or bottom chord shall not be less than fifty feet above the city directrix at its greatest span. Second, that it shall have at least one span five hundred feet in the clear, or two spans of three hundred and fifty feet in the clear of abutments. If the two latter spans be used, the one over the main steamboat channel shall be fifty feet above the city directrix, measured to the lowest part of the bridge at the centre of the span. Third, no span over the water at low-water mark, shall be less than two hundred feet in the clear of abutments.

Sec. 13. **And be it further enacted,** That the right to alter or amend this act, so as to prevent or remove all material obstructions to the navigation of said river by the construction of bridges, is hereby expressly reserved.

Approved, July 25, 1866.

FIFTY-SIXTH CONGRESS

SESSION I

CHAP. 34

An Act Authorizing the construction of a bridge across the Mississippi River at Dubuque, Iowa.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That the Dubuque and Wisconsin Bridge Company, a corporation duly incorporated under the laws of the State of Iowa, its successors and assigns, be, and is hereby, authorized to construct and maintain, at a point suitable to the interests of navigation, a bridge for the passage of vehicles of all kinds, animals, and foot passengers across the Mississippi River from a point at or near Eagle Point, in the city of Dubuque, in the State of Iowa, to the opposite shore of said river in the county of Grant, in the State of Wisconsin; that said bridge shall not be built within two miles of any other bridge on said river following the course of the main channel; that the location and plan or manner of constructing said bridge shall be subject to the approval of the Secretary of War, and until decided by him to be such as will not materially affect the interests of navigation the said bridge shall not be built; and there shall be submitted to the Secretary of War for his examination and approval a design and drawing of the proposed bridge and a map of the location, giving, for the space of a mile above and below the proposed location, the topography of the banks of the river, the shore line at high and low water, the direction and strength of the currents at all stages, and the soundings, accurately showing the bed of the stream, the location of any other bridge, and all other information required, and should any change be made in the plan of said bridge during the progress of construction such

change shall be subject to the approval of the Secretary of War, and the said structure shall at all times be so kept and managed and be provided with such guard fences, sheer booms, and other structures as to offer reasonable and proper means for the passage of vessels and other floating craft through or under said structure; and for the safety of vessels passing at night there shall be displayed on said bridge from the hours of sunset to sunrise such lights as may be prescribed by the Light-House Board; and the said structure shall be changed at the cost and the expense of the owners thereof, from time to time, as the Secretary of War may direct, so as to preserve the free and convenient navigation of said river.

Sec. 2. That said bridge between the Iowa shore and the lowlands or islands on the Wisconsin side of the river shall be constructed with unbroken and continuous spans, and the main span shall be over the main navigable channel of the river, and shall give a clear width of waterway not less than three hundred and fifty feet, and shall give clear headroom the full length of said span of not less in any case than fifty-five feet above extreme high water mark, as understood at the point of location. The remaining spans shall each give a clear width of waterway of not less than two hundred feet, and a clear headroom of not less in any case than ten feet between extreme high water mark and the lower chords of the superstructure. Said bridge shall be constructed at right angles to, and its piers parallel with, the current of the river.

Sec. 3. That said Dubuque and Wisconsin Bridge Company shall have the right to charge and collect a reasonable rate of toll for the passage across said bridge of vehicles, animals, and foot passengers, and travelers, subject to approval by the Secretary of War.

Sec. 4. That this Act shall be null and void if actual construction of the bridge herein authorized be not commenced within eighteen months, and completed within three years from the date of the passage thereof.

Sec. 5. That the bridge built under this Act and subject to its limitations shall be a lawful structure, and shall be known and recognized as a post route, and it shall enjoy the rights and privileges of other post-roads of the United States; and equal privileges in the use of said bridge shall be granted to all telegraph and telephone companies; and the United States shall have the right of way across said bridge and its approaches for postal telegraph purposes.

Sec. 6. That the right to alter, amend, or repeal this Act is hereby expressly reserved.

Approved, March 6, 1900.

TABLE A-1

ESTIMATED ANNUAL AVERAGE DAILY TRAFFIC
BRIDGE PROGRAM II

FISCAL YEAR[1]	BRIDGES			TOTAL TRANS-RIVER
	EAGLE POINT	JULIEN DUBUQUE (Toll)	U. S. ROUTE 20 BYPASS	
1971	5,850	10,770	1,630	18,250
1972	6,390	11,150	1,870	19,410
1973	6,640	11,540	2,040	20,220
1974	6,910	11,940	2,120	20,970
1975	7,180	12,360	2,200	21,740
1976	7,470	12,790	2,290	22,550
1977	7,690	13,180	2,380	23,250
1978	7,920	13,570	2,470	23,960
1979	8,160	13,980	2,550	24,690
1980	8,410	14,400	2,640	25,450
1981	8,660	14,830	2,730	26,220
1982	8,880	15,200	2,800	26,880
1983	9,100	15,580	2,870	27,550
1984	9,330	15,970	2,940	28,240
1985	9,560	16,370	3,020	28,950
Next 13 Years Annually	9,560	16,370	3,020	28,950

[1] Twelve-month period beginning July 1.

TABLE A-2

ESTIMATED ANNUAL TOLL REVENUES
BRIDGE PROGRAM II

FISCAL YEAR[1]	BRIDGES: EAGLE POINT	BRIDGES: JULIEN DUBUQUE (Toll)	BRIDGES: U. S. ROUTE 20 BYPASS	TOTAL TRANS-RIVER
1971	$451,000	$ 822,000	$149,000	$1,422,000
1972	493,000	850,000	170,000	1,513,000
1973	512,000	880,000	186,000	1,578,000
1974	533,000	911,000	194,000	1,638,000
1975	554,000	943,000	201,000	1,698,000
1976	576,000	976,000	209,000	1,761,000
1977	594,000	1,005,000	218,000	1,817,000
1978	611,000	1,035,000	225,000	1,871,000
1979	630,000	1,066,000	233,000	1,929,000
1980	649,000	1,098,000	241,000	1,988,000
1981	668,000	1,131,000	250,000	2,049,000
1982	685,000	1,160,000	256,000	2,101,000
1983	702,000	1,189,000	262,000	2,153,000
1984	719,000	1,218,000	269,000	2,206,000
1985	737,000	1,249,000	276,000	2,262,000
Next 13 Years Annually	737,000	1,249,000	276,000	2,262,000
AVERAGE ANNUAL REVENUES				
First Five Years	$508,000	$ 881,000	$180,000	$1,569,000
First Ten Years	$560,000	$ 959,000	$203,000	$1,722,000
Twenty-Eight Years	$668,000	$1,135,000	$247,000	$2,050,000

[1] Twelve-month period beginning July 1.

TABLE A-3

ESTIMATED ANNUAL MAINTENANNCE AND OPERATION COSTS[1]
BRIDGE PROGRAM II

FISCAL YEAR[2]	BRIDGES			TOTAL TRANS-RIVER
	EAGLE POINT	JULIEN DUBUQUE (Toll)	U. S. ROUTE 20 BYPASS	
1971	$ 70,000	$130,000	$ 60,000	$260,000
1972	74,000	137,000	63,000	274,000
1973	78,000	144,000	66,000	288,000
1974	82,000	151,000	69,000	302,000
1975	86,000	158,000	72,000	316,000
1976	90,000	165,000	75,000	330,000
1977	94,000	172,000	78,000	344,000
1978	98,000	179,000	81,000	358,000
1979	102,000	186,000	84,000	372,000
1980	106,000	193,000	87,000	386,000
1981	110,000	200,000	90,000	400,000
1982	114,000	207,000	93,000	414,000
1983	118,000	214,000	96,000	428,000
1984	122,000	221,000	99,000	442,000
1985	126,000	228,000	102,000	456,000
Next 13 Years Annually	126,000	228,000	102,000	456,000

[1] Estimated by Howard, Needles, Tammen & Bergendoff.
[2] Twelve-month period beginning July 1.

TABLE A-4

ESTIMATED ANNUAL NET REVENUES
BRIDGE PROGRAM II

FISCAL YEAR[1]	BRIDGES: EAGLE POINT	BRIDGES: JULIEN DUBUQUE (Toll)	BRIDGES: U. S. ROUTE 20 BYPASS	TOTAL TRANS-RIVER
1971	$381,000	$ 692,000	$ 89,000	$1,162,000
1972	419,000	713,000	107,000	1,239,000
1973	434,000	736,000	120,000	1,290,000
1974	451,000	760,000	125,000	1,336,000
1975	468,000	785,000	129,000	1,382,000
1976	486,000	811,000	134,000	1,431,000
1977	500,000	833,000	140,000	1,473,000
1978	513,000	856,000	144,000	1,513,000
1979	528,000	880,000	149,000	1,557,000
1980	543,000	905,000	154,000	1,602,000
1981	558,000	931,000	160,000	1,649,000
1982	571,000	953,000	163,000	1,687,000
1983	584,000	975,000	166,000	1,725,000
1984	597,000	997,000	170,000	1,764,000
1985	611,000	1,021,000	174,000	1,806,000
Next 13 Years Annually	611,000	1,021,000	174,000	1,806,000
AVERAGE ANNUAL NET REVENUES				
First Five Years	$431,000	$ 737,000	$114,000	$1,282,000
First Ten Years	$472,000	$ 797,000	$129,000	$1,398,000
Twenty-Eight Years	$557,000	$ 933,000	$157,000	$1,647,000

[1] Twelve-month period beginning July 1.

TABLE A-5

RELATIONSHIP BETWEEN LEVEL DEBT SERVICE AND NET REVENUES
BRIDGE PROGRAM II

FISCAL YEAR[1]	BRIDGES							
	EAGLE POINT		JULIEN DUBUQUE (Toll)		U. S. ROUTE 20 BYPASS		TOTAL TRANS-RIVER (NET)	
	Surplus	Deficit	Surplus	Deficit	Surplus	Deficit	Surplus	Deficit
1971	$ 9,000		$ 658,000			$ 471,000	$ 196,000	
1972	47,000		679,000			453,000	273,000	
1973	62,000		702,000			440,000	324,000	
1974	79,000		726,000			435,000	370,000	
1975	96,000		751,000			431,000	416,000	
1976	114,000		777,000			426,000	465,000	
1977	128,000		799,000			420,000	507,000	
1978	141,000		822,000			416,000	547,000	
1979	156,000		846,000			411,000	591,000	
1980	171,000		871,000			406,000	636,000	
1981	186,000		897,000			400,000	683,000	
1982	199,000		919,000			397,000	721,000	
1983	212,000		941,000			394,000	759,000	
1984	225,000		963,000			390,000	798,000	
1985	239,000		987,000			386,000	840,000	
Next 13 Years Annually	239,000		987,000			386,000	840,000	
TOTAL	$5,171,000		$25,169,000			$11,294,000	$19,046,000	
Net Surplus or (Deficit)	$5,171,000		$25,169,000		($11,294,000)		$19,046,000	

[1] Twelve-month period beginning July 1.

TABLE A-6

ESTIMATED ANNUAL AVERAGE DAILY TRAFFIC
BRIDGE PROGRAM V

FISCAL YEAR[1]	BRIDGES			TOTAL TRANS-RIVER
	CITY ISLAND (Two-Lane)	JULIEN DUBUQUE (Toll)	U. S. ROUTE 20 BYPASS	
1971	7,200	9,470	1,630	18,300
1972	7,860	9,800	1,860	19,520
1973	8,170	10,140	2,040	20,350
1974	8,500	10,500	2,120	21,120
1975	8,840	10,860	2,200	21,900
1976	9,190	11,240	2,290	22,720
1977	9,470	11,580	2,380	23,430
1978	9,750	11,930	2,470	24,150
1979	10,050	12,280	2,550	24,880
1980	10,350	12,650	2,640	25,640
1981	10,660	13,030	2,730	26,420
1982	10,920	13,360	2,800	27,080
1983	11,200	13,690	2,870	27,760
1984	11,480	14,040	2,940	28,460
1985	11,760	14,390	3,010	29,160
Next 13 Years Annually	11,760	14,390	3,010	29,160

[1] Twelve-month period beginning July 1.

TABLE A-7

ESTIMATED ANNUAL TOLL REVENUES
BRIDGE PROGRAM V

FISCAL YEAR[1]	BRIDGES: CITY ISLAND (Two-Lane)	BRIDGES: JULIEN DUBUQUE (Toll)	BRIDGES: U. S. ROUTE 20 BYPASS	TOTAL TRANS-RIVER
1971	$555,000	$ 722,000	$149,000	$1,426,000
1972	606,000	747,000	170,000	1,523,000
1973	630,000	774,000	186,000	1,590,000
1974	655,000	801,000	194,000	1,650,000
1975	682,000	829,000	201,000	1,712,000
1976	709,000	858,000	209,000	1,776,000
1977	730,000	883,000	218,000	1,831,000
1978	752,000	910,000	225,000	1,887,000
1979	775,000	937,000	233,000	1,945,000
1980	798,000	965,000	241,000	2,004,000
1981	822,000	994,000	250,000	2,066,000
1982	842,000	1,019,000	256,000	2,117,000
1983	864,000	1,045,000	262,000	2,171,000
1984	885,000	1,071,000	269,000	2,225,000
1985	907,000	1,098,000	276,000	2,281,000
Next 13 Years Annually	907,000	1,098,000	276,000	2,281,000
AVERAGE ANNUAL REVENUES				
First Five Years	$626,000	$ 775,000	$180,000	$1,581,000
First Ten Years	$689,000	$ 843,000	$203,000	$1,735,000
Twenty-Eight Years	$821,000	$ 997,000	$247,000	$2,065,000

[1] Twelve-month period beginning July 1.

TABLE A-8

ANNUAL MAINTENANCE AND OPERATION COSTS[1]
BRIDGE PROGRAM V

FISCAL YEAR[2]	CITY ISLAND (Two-Lane)	JULIEN DUBUQUE (Toll)	U. S. ROUTE 20 BYPASS	TOTAL TRANS-RIVER
1971	$ 70,000	$130,000	$ 60,000	$260,000
1972	74,000	137,000	63,000	274,000
1973	78,000	144,000	66,000	288,000
1974	82,000	151,000	69,000	302,000
1975	86,000	158,000	72,000	316,000
1976	90,000	165,000	75,000	330,000
1977	94,000	172,000	78,000	344,000
1978	98,000	179,000	81,000	358,000
1979	102,000	186,000	84,000	372,000
1980	106,000	193,000	87,000	386,000
1981	110,000	200,000	90,000	400,000
1982	114,000	207,000	93,000	414,000
1983	118,000	214,000	96,000	428,000
1984	122,000	221,000	99,000	442,000
1985	126,000	228,000	102,000	456,000
Next 13 Years Annually	$126,000	$228,000	$102,000	$456,000

[1] Estimated by Howard, Needles, Tammen & Bergendoff.
[2] Twelve-month period beginning July 1.

TABLE A-9

ESTIMATED ANNUAL NET REVENUE
BRIDGE PROGRAM V

FISCAL YEAR[1]	BRIDGES: CITY ISLAND (Two-Lane)	BRIDGES: JULIEN DUBUQUE (Toll)	BRIDGES: U. S. ROUTE 20 BYPASS	TOTAL TRANS-RIVER
1971	$485,000	$592,000	$ 89,000	$1,166,000
1972	532,000	610,000	107,000	1,249,000
1973	552,000	630,000	120,000	1,302,000
1974	573,000	650,000	125,000	1,348,000
1975	596,000	671,000	129,000	1,396,000
1976	619,000	693,000	134,000	1,446,000
1977	636,000	711,000	140,000	1,487,000
1978	654,000	731,000	144,000	1,529,000
1979	673,000	751,000	149,000	1,573,000
1980	692,000	772,000	154,000	1,618,000
1981	712,000	794,000	160,000	1,666,000
1982	728,000	812,000	163,000	1,703,000
1983	746,000	831,000	166,000	1,743,000
1984	763,000	850,000	170,000	1,783,000
1985	781,000	870,000	174,000	1,825,000
Next 13 Years Annually	781,000	870,000	174,000	1,825,000
AVERAGE ANNUAL NET REVENUES				
First Five Years	$548,000	$631,000	$114,000	$1,293,000
First Ten Years	$601,000	$681,000	$129,000	$1,411,000
Twenty-Eight Years	$711,000	$796,000	$157,000	$1,664,000

[1] Twelve-month period beginning July 1.

TABLE A-10

RELATIONSHIP BETWEEN LEVEL DEBT SERVICE AND NET REVENUES
BRIDGE PROGRAM V

FISCAL YEAR[1]	BRIDGES							
	CITY ISLAND (Two-Lane)		JULIEN DUBUQUE (Toll)		U. S. ROUTE 20 BYPASS		TOTAL TRANS-RIVER (Net)	
	Surplus	Deficit	Surplus	Deficit	Surplus	Deficit	Surplus	Deficit
1971		$ 110,000	$ 558,000			$ 471,000		$ 23,000
1972		63,000	576,000			453,000	60,000	
1973		43,000	596,000			440,000	113,000	
1974		22,000	616,000			435,000	159,000	
1975	$ 1,000		637,000			431,000	207,000	
1976	24,000		659,000			426,000	257,000	
1977	41,000		677,000			420,000	298,000	
1978	59,000		697,000			416,000	340,000	
1979	78,000		717,000			411,000	384,000	
1980	97,000		738,000			406,000	429,000	
1981	117,000		760,000			400,000	477,000	
1982	133,000		778,000			397,000	514,000	
1983	151,000		797,000			394,000	554,000	
1984	168,000		816,000			390,000	594,000	
1985	186,000		836,000			386,000	636,000	
Next 13 Years Annually	186,000		836,000			386,000	636,000	
TOTAL	$3,473,000	$ 238,000	$21,326,000			$11,294,000	$13,290,000	$ 23,000
Net Surplus or (Deficit)	$3,235,000		$21,326,000		($11,294,000)		$13,267,000	

[1] Twelve-month period beginning July 1.